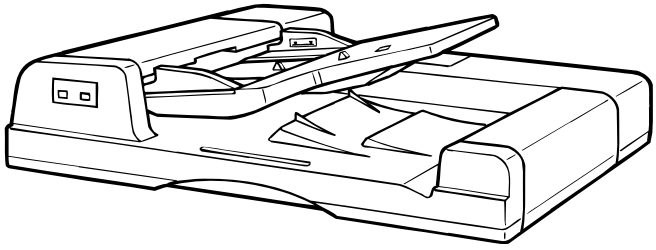
# SHARP SERVICE MANUAL

CODE: 00ZSFA55SM//E



## MODEL SF-A55

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PARTS GUIDE


Parts marked with "⚠" is important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.


**SHARP CORPORATION**

This document has been published to be used for after sales service only.

# [1] PRODUCT OVERVIEW

The SF-A55 is a reversing automatic document feeder (RADF). The SF-A54 can be used with the copier SF-2050. The SF-A55 is capable of automatically copying both sides of document by inverting the document sheets up-side down, while feeding them.
Even document sheets of different lengths and the same width may be set in the document tray, an internal sensor in the ADF senses the document size when the document is fed. The copier automatically selects the proper copy paper corresponding to the document size along with the appropriate magnification ratio.
If the appropriate copy paper, respective to the document size and the magnification ratio, is not available, the copier stops copying and indicates the required paper size on the display.

# [2] SPECIFICATIONS

- Orientation of document setting: Face up
- Document setting position: Center alignment
- Document transfer drive: Belt drive
- Document feed sequence: Bottom take-up feeding (Face-up discharge)
- Document size: A3 ~ B5/11" x 17" ~ 8-1/2" x 5-1/2"
- Document changing time: 0.45 sec or less
- Document weight: Thin paper mode; 35~50g/$m^2$
  Standard mode; 51~128g/$m^2$
- Max. No. of documents to be set: 50 sheets (A4, letter)
  35 ~ 80g/$m^2$ (9-21lb), 5mm thick or less
  80 ~ 128g/$m^2$ (21-33lb), 5mm thick or less
- Document stopper: Mechanical stopper
- Dimensions: 595 (W) x 525 (D) x 130 (H)mm (23.5" x 20.7" x 5.1")
- Weight: Approx. 15kg
- Power supply: Supplied from the copier.

### [Features]

- Document detection on tray (Irregular-sized documents are copied without size recognition.)
- Recognized paper sizes:
  Japan: A3, B4, A4, A4R, B5, B5R,
  English: 11" x 17", 8-1/2" x 14", 8-1/2 x 11", 8-1/2" x 11"R, 8-1/2" x 5-1/2",
  Non-Japanese A/B line: A3, B4, A4, A4R, A5
- Mixed document: Possible
- Document inversion: Automatic

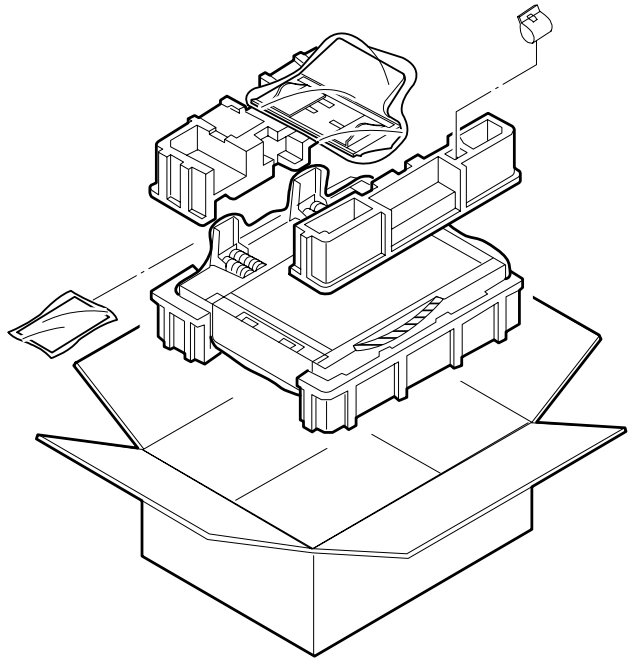
### [Display]

- Document feed indicator: Lights when document(s) are set on feed tray and indicates that RADF is ready.
- Remove original indicator: When originals are placed manually, the LED lights at the same time as exposure of the last document sheet is finished. The LED goes out when the document feed cover is opened.

# [3] UNPACKING AND INSTALLATION

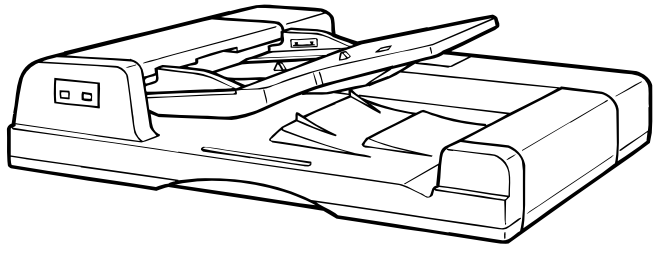
## 1. Unpacking

Unpack the RADF while referring to the figure below.

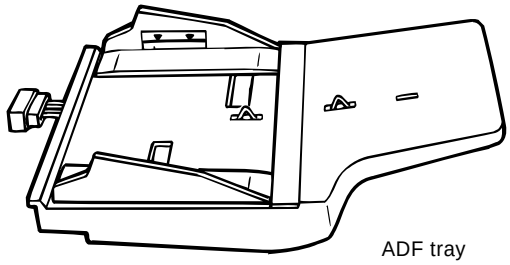


## 2. Installation

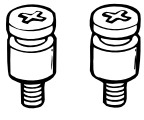
FOR USE WITH COMPATIBLE SHARP COPIERS. SEE SHARP COPIER INSTALLATION MANUAL TO DETERMINE SUITABILITY.



SF-A55



ADF tray



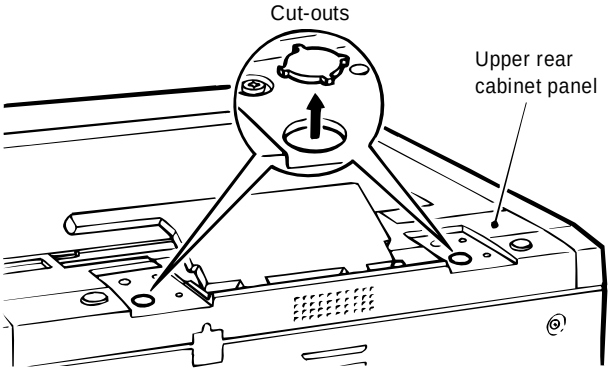
ADF mounting screws (2pcs.)

ADF securing screws (2pcs.)

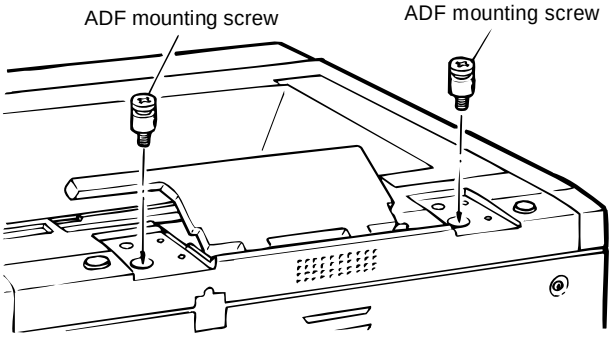
## Unplug the copier and follow the procedure below.

### (1) Mount the ADF onto the copier.

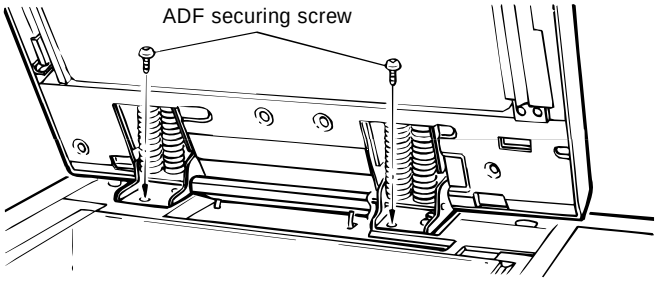
Remove the 2 cut-outs from the upper cabinet panel of the copier.

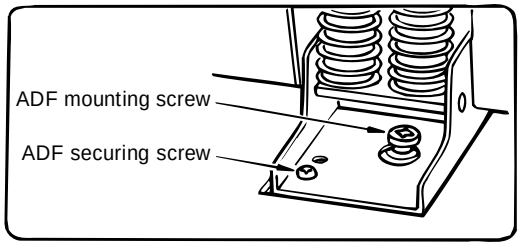



Install the 2 ADF mounting screws.



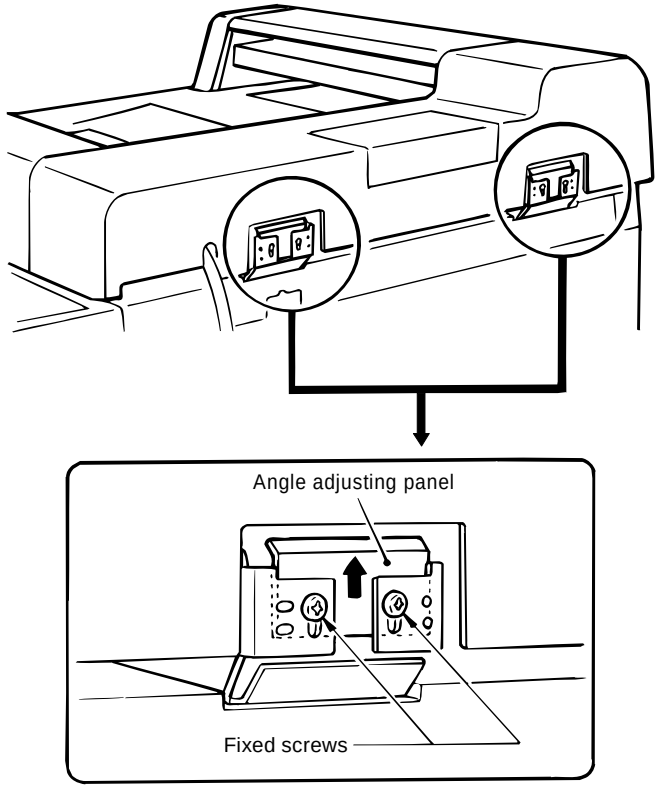

Fit the holes in the hinges of the ADF onto the ADF mounting screws and secure the ADF with the two ADF securing screws.



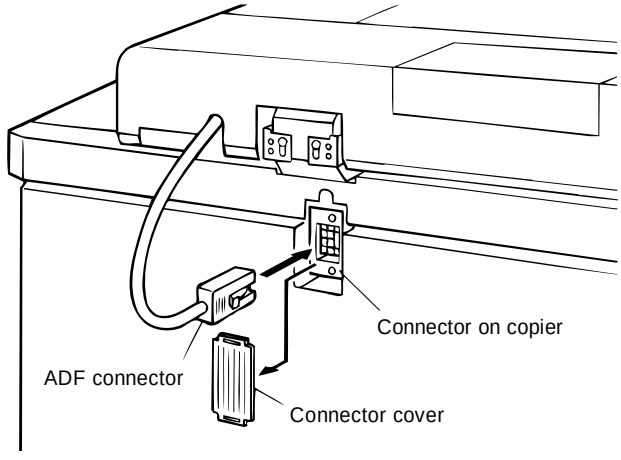

### (2) Adjust the angle of ADF.

Loosen the two fixed screws for the angle adjusting panel which are located on the hinge angle and then fasten the loosened screws while raising the angle adjusting panel completely.



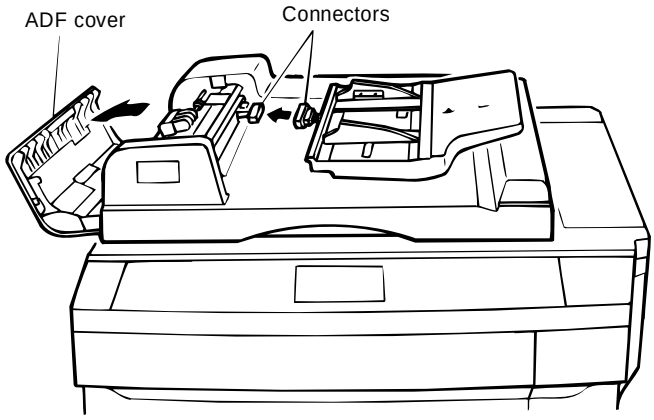

### (3) Connect the ADF connector.

Remove the connector cover from the copier's rear cabinet panel. Next, connect the ADF connector to the connector on the copier.



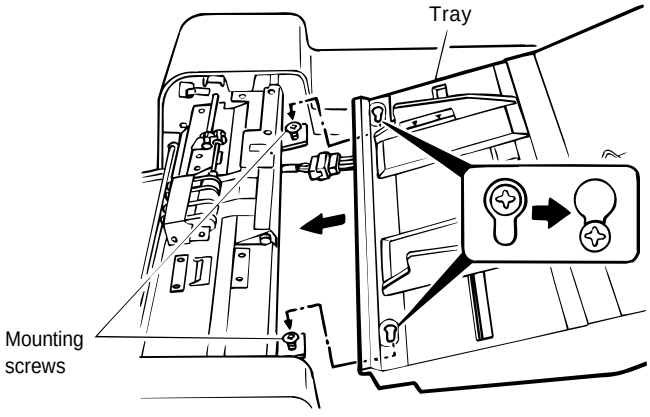
### (4) Connect the ADF tray connector.

Open the ADF cover and connect the ADF connector to the tray connector.




### (5) Attach the tray.

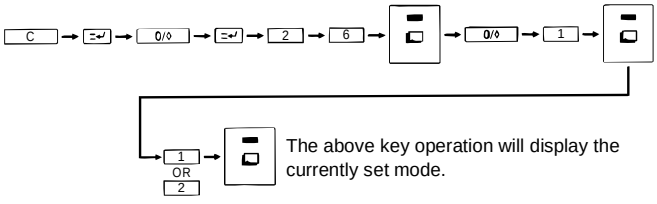
Loosen the two mounting screws and secure the tray with the screws as shown in the figure.
Close the ADF cover.




## Plug the copier into a grounded outlet and turn the power switch on.
## Then, follow the procedure below.

### (6) Set the mode.

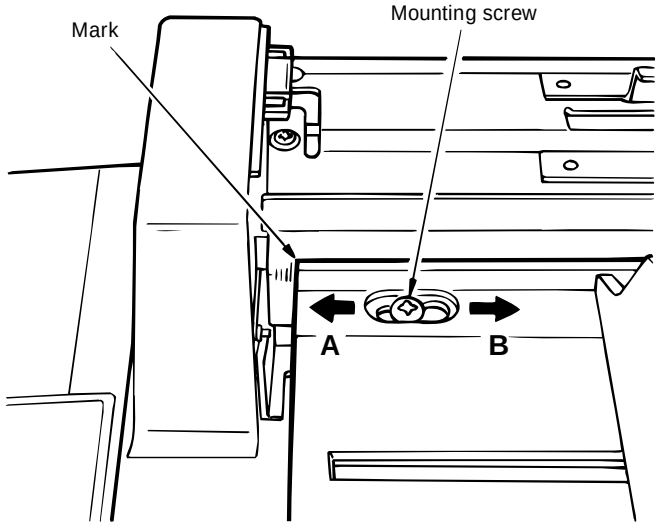
Operate the keys on the copier to set the mode.



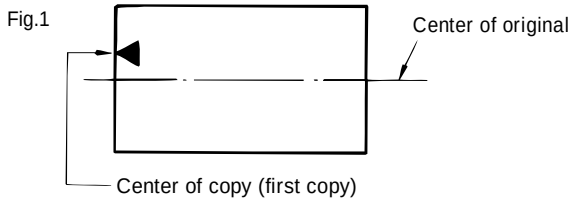

SIMULATION No. 26-1
SORTER/STAPLE SORTER SETTING?
1. YES 2. NO

### (7) Adjust the center of the copy.

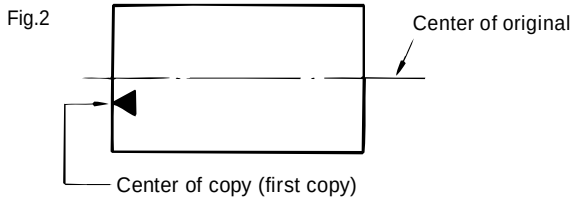
Set the original on the tray and make a copy. When the copy slips out of the center as Fig. 1 or Fig. 2, open the ADF cover, loosen the two mounting screws and adjust the tray to correct position.




★ Fig. 1
Move the tray in the direction A and secure it with the two mounting screws. Make sure that it is centered properly.

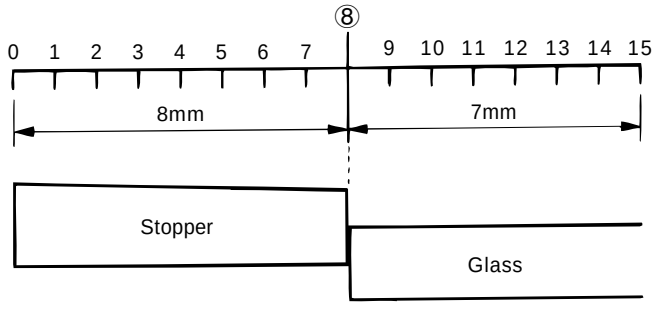



★ Fig. 2
Move the tray in the direction B and secure it with the two mounting screws. Make sure that it is centered properly.



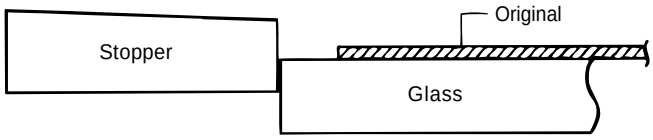

### (8) Original lead edge position adjustment.

- The original lead edge position for RADF can be determined using the test command 53.
- For it had been factory set that the lead edge should stop on the location 8, but it may be needed to make adjustment. It can be adjusted within a range of 8mm (8 steps) at the stopper side and 7mm (7 steps) at the glass side. Adjustment can be done for each mode of single sided, double sided, and light weight paper.

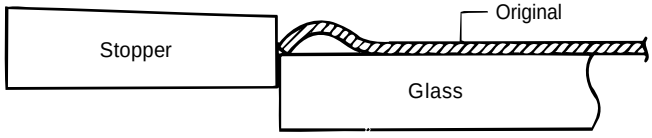


- **Setup example**

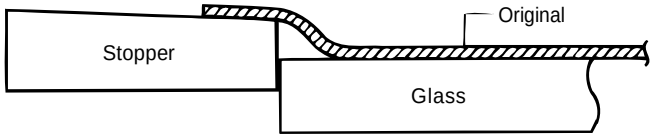
(1) If the lead edge of the original was still not to the stopper, enter an optimum value.




(2) If the image at the lead edge of the original were to deform, enter an optimum value to move to the glass side.




(3) If the original were to override the stopper, enter an optimum value to move it to the glass side.




After finished selecting settings using test command 53; the screen shown in the illustration bellow will appear. Select one of the numbers from this screen then use the 10-key pad to enter a setting for items #1 through #15.

SIMULATION No. 53

01 ~ 04: ORIGINAL STOP POINT SETUP.

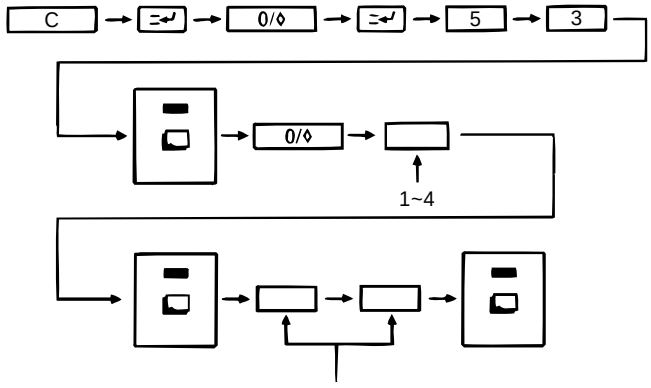
| | NOM ☐ | THIN ☐ | SIMP | DUP |
|---|---|---|---|---|
| 1 | * | | * | |
| 2 | * | | | * |
| 3 | | * | * | |
| 4 | | * | | * |

05 ~ 06: (NO PROGRAM)

07 ~ 10: RADF SENSOR ADJUSTMENT.

07.REGIST 08.TIMING

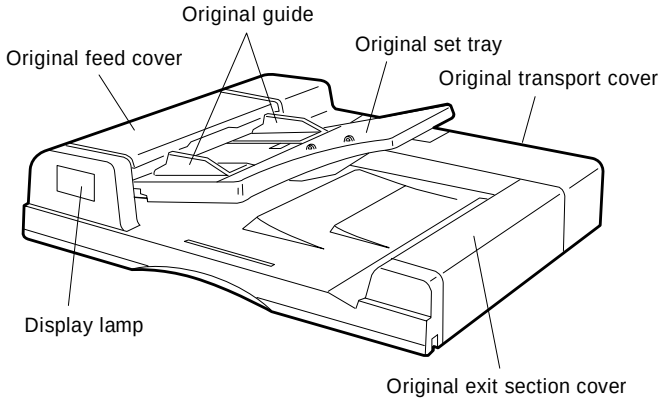
09.EXIT REVERSAL 10.EMPTY



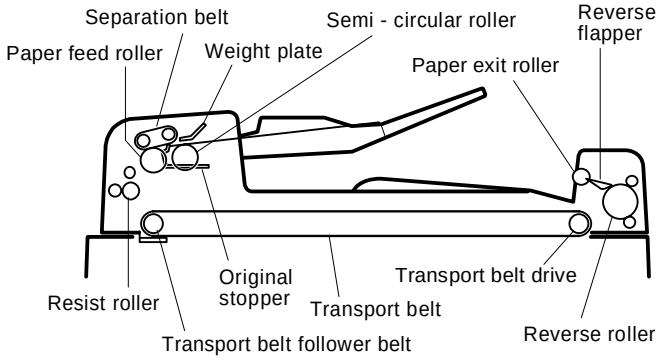

Set to between 0 and 15 as dictated by the copier's performance.
The factory setting is "8".

# [4] STRUCTURE

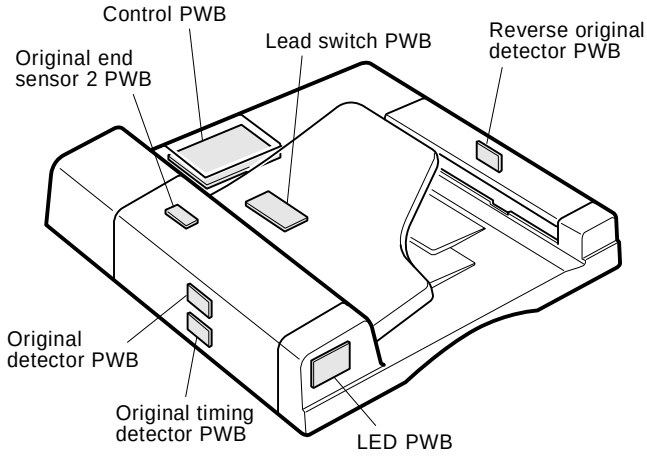
## A. External fitting




## B. Mechanism




## C. PWB distribution



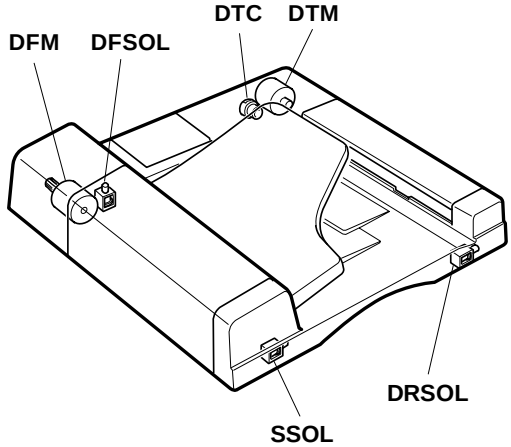

## D. Motors, solenoids, and clutches

### ■ Motors

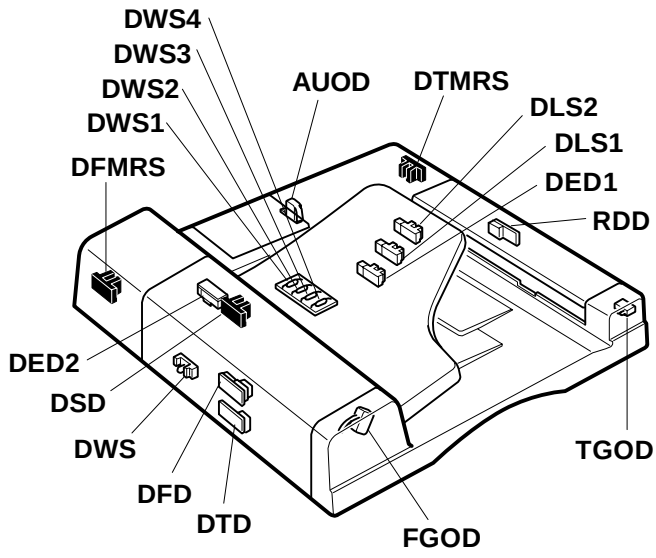
| Code | Name | Type | Function, operation |
|---|---|---|---|
| DFM | Paper feed motor | DC motor | Drives the pick-up roller, the separation roller, and the resist roller. |
| DTM | DC motor | DC motor | Drives the transport belt roller, the reverse roller, and the transport roller. |

### ■ Solenoids and clutches

| Code | Name | Type | Function, operation | Contact, output |
|---|---|---|---|---|
| SFSOL | Paper feed solenoid | DC solenoid | Presses the weight plate of the paper feed section onto the original. | When ON, the weight plate is lowered. |
| SSOL | Shutter solenoid | DC solenoid | Opens/closes the paper feed section shutter. | When ON, the shutter is lowered. |
| DRSOL | Reverse solenoid | DC solenoid | Drives the reverse flapper to select the path of paper exit or reverse. | When ON, the reverse path is selected. |
| DTC | Transport clutch | Electromagnetic clutch | Drives the transport motor and connects/releases the transport belt roller. | When ON, the drive is connected. |



## E. Sensors, switches, detectors



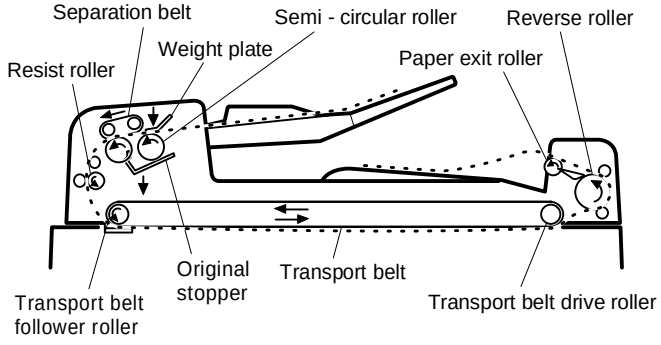

| Code | Name | Type | Function, operation | Contact, output |
|---|---|---|---|---|
| DFD | Original feed sensor | Reflection sensor | Turns HIGH when the original lead edge is fed just in front of the resist roller. | HIGH when the original is sensed. |
| DTD | Original timing sensor | Reflection sensor | HIGH when the original lead edge is transported from the paper feed section to the vicinity of the transport belt. | HIGH when the original is detected. |
| DED1 | Original end sensor 1 | Photo interrupter | Final paper sensor 1 on the tray | HIGH when the original is sensed. |
| DED2 | Original end sensor 2 | Reflection sensor | Final paper sensor 2 on the tray (AB series) | HIGH when the original is sensed. |
| RDD | Original reverse sensor | Reflection sensor | Turns HIGH when the original lead edge is transported to the reverse/paper exit path. | HIGH when the original is sensed. |
| DSD | Original set detector | Photo interrupter | Detects an original on the tray. | LOW when the original is sensed. |
| DWS | Original width sensor | Photo interrupter | Senses the original width. | HIGH when the original is sensed. |
| DFMRS | Paper feed motor rotation sensor | Photo interrupter | Senses the paper feed motor rotations. | Pulse output |
| DTMRS | Transport motor rotation sensor | Photo interrupter | Senses the transport motor rotations. | Pulse output |
| DLS1 | Original length sensor 1 | Photo interrupter | Senses the original length on the tray. | HIGH when the original is sensed. |
| DLS2 | Original length sensor 2 | Photo interrupter | Senses the original length on the tray. (Inch series only) | HIGH when the original is sensed. |
| DWS1 | Original width switch 1 | Lead switch | Senses the original width on the tray. (11", 297mm) | ON when detected. |
| DWS2 | Original width switch 2 | Lead switch | Senses the original width on the tray. (257mm, AB series only) | ON when detected. |
| DWS3 | Original width switch 3 | Lead switch | Senses the original width on the tray. (8 1/2" 210mm) | ON when detected. |
| DWS4 | Original width switch 4 | Lead switch | Senses the original width on the tray. )182mm, AB series only) | ON when detected. |
| AUOD | ADF open/close switch | Microswitch | Senses the ADF unit open/close. | Close when closed. |
| FGOD | Paper feed guide open/close switch | Microswitch | Senses the paper feed cover open/close. | Close when closed. |
| TGOD | Reverse guide open/close switch | Microswitch | Senses the reverse cover open/close. | Close when closed. |

# [5] OPERATIONAL DESCRIPTIONS (MECHANISM SECTION)

## A. ADF mode (Single mode) operation

The figure below shows the original transport path from paper feeding, copying, transporting, and discharging. For details of the operations, refer to the operation process.

shows the original transport path.




### 1) ADF mode (single mode) copying process

START

↓

Step 01: The transport section is closed. (AUOD ON)

↓

Step 02: An original is set on the original tray. (DSD output LOW level)

↓

Step 03: Original feed display ON

↓

Step 04: Print SW ON

↓

(Preliminary paper feed): For the first passing original, dummy paper exit is performed.

↓

Step 05: Paper feed motor (DFM) reverse rotation. (Paper feed roller, semi-circular roller, separation roller rotation) Since the stopper is up, no paper is fed.

↓

Step 06: Transport clutch (DTC) ON

↓

Step 07: Transport motor (DTM) forward rotation (Transport belt, reverse roller, paper exit roller rotation)

∗ A when an original has been on the original table, the original is discharged.

↓

Step 08: Paper feed solenoid (DFSOL) ON
(The weight plate is lowered to press the original onto the semi-circular roller.)
The shutter solenoid is turned on.
(The stopper is lowered and the original is fed.)

↓

∗ A Step 09: Reverse original sensor (RDD) senses the lead edge of the discharged original. (RDO output level: LOW)

↓

∗ A Step 10: Transport motor (DTM) rpm is reduced.

↓

Step 11: The original feed sensor (DFD) senses the lead edge of the original. (DFD output: LOW)

↓

Step 12: The original is stopped by the resist roller.
Paper feed motor (DFM) OFF

↓

Step 13: Paper feed motor (DFM) forward rotation (Resist roller rotation)
The lead edge of original is taken up with the resist roller.

↓

Step 14: The original width sensor (DWS) senses the original width. (Output: HIGH)

↓

Step 15: Paper feed motor (DFM) OFF
(The original is stopped with its lead edge taken up with the resist roller.)

↓

∗ A Step 16: The reverse original sensor (RDD) senses the rear edge of the discharged original.
(RDD output: HIGH)

↓

∗ A Step 17: Original discharge

↓

Step 18: Transport motor (DTM) OFF
(Transport belt, reverse roller, paper exit roller stop)

↓

(Paper feed)

↓

Step 19: Transport motor (DTM) forward rotation (Transport belt, reverse roller, paper exit rotation)

↓

Step 20: Paper feed motor (DFM) forward rotation (Resist roller rotation)
The original is transported to the transport section.

↓

Step 21: Timing sensor (DTD) senses the rear edge of the original. (DFD output: HIGH)

↓

Step 22: Original width sensor (DWS) output LOW level

↓

∗ C Step 23: Transport motor (DTM) rotation falls.

∗ C: Rotation falls only in the thin paper mode, and does not fall in the switchback mode.

↓

Step 24: Transport motor (DTM) OFF
(Transport belt, reverse roller, paper exit roller stop)
Electromagnetic brake (DTBC) ON (only in the thin paper mode)
Original stop

↓

Step 25: Paper feed motor (DFM) OFF
(Resist roller stop)

↓

∗ B Step 26: Shutter solenoid (SSOL) OFF
(The stopper rises.)
Paper feed solenoid (DFSOL) OFF
(the weight plate rises.)

∗ B: If there is no paper on the original tray, the stopper and the weight plate are lifted up.

↓

∗ D Step 27: Transport motor (DTM) reverse rotation (Transport belt, reverse roller, paper exit roller rotation)
The switchback operation starts.

∗ D: The switchback operation is not made in the thin paper mode.

↓

∗ D Step 28: The original is stopped by the original stopper.
Transport motor (DTM) OFF
Electromagnetic brake (DTBC) ON
(Transport belt, reverse roller, paper exit roller stop)

Step 29: Electromagnetic brake (DTBC) OFF (if there is no original when discharging.)

Step 30: The copier mirror base starts scanning.

∗ E DSD HIGH (No original on the tray) → After completion of mirror base scanning, go to Step 65.

LOW (Some original on the tray)

(Preliminary paper feed)

Step 31: Paper feed motor (DFM) reverse rotation
(Paper feed roller, semi-circular roller, separation roller rotation)
The original is fed.

Step 32: The original feed sensor detects the lead edge of the original.
(DFD output: HIGH)

Step 33: The original is stopped by the resist roller.
Paper feed motor (DFM) OFF

Step 34: Paper feed motor (DFM) forward rotation
(Resist roller rotation)
The original lead edge is taken up by the resist roller.

Step 35: The original width sensor (DWS) senses the original width.

Step 36: Paper feed motor (DFM) OFF
(OFF with the original lead edge taken up with the resist roller.)

Step 37: The copier mirror base scanning stop

(Paper exit)

Step 38: Transport motor (DTM) forward rotation
(Transport belt, reverse roller, paper exit roller rotation)
The original discharging is started.

Step 39: Paper feed motor (DFM) forward rotation
(Resist roller rotation)
The original is fed to the transport section.

Step 40: Timing sensor (DTD) senses the rear edge of the original.
(DFD output: HIGH)

Step 41: The Reverse sensor (RDD) senses the reversed original lead edge.
(ROD output: HIGH)

∗ C Step 42: The transport motor (DTM) rpm falls.

∗ C: The rpm falls only in the thin paper mode, and does not fall in switchback.

Step 43: Transport motor (DTM) OFF
(Transport belt, reverse roller, paper exit roller stop)
Brake clutch (DTBC) ON (only in the thin paper mode)
The original is stopped.

Step 44: Paper feed motor (DFM) OFF (Resist roller stop)

∗ B Step 45: Shutter solenoid (SSOL) OFF
(The stopper rises.)
(Paper feed solenoid (DFSOL) OFF
(The weight plate rises.)

∗ B When there is no original on the original tray, the stopper and the weight plate are lifted.

∗ D Step 46: Transport motor (DTM) reverse rotation
(Transport belt, reverse roller, paper exit roller rotation)
The switchback operation is started.

∗ D: The switchback operation is not made in the thin paper mode.

∗ D Step 47: The original is stopped by the original stopper.
Transport motor (DTM) OFF
Brake clutch (DTBC) ON
(Transport belt, reverse roller, paper exit roller stop)

Step 48: The copier mirror base scanning is start.

∗ E DSD output HIGH (No original on the tray) → Go to step 71 (Following the paper exit process.)

LOW: (Some paper on the tray)

(Preliminary paper feed, following the paper exit process)

Step 49: Paper feed motor (DFM) reverse rotation
(Paper feed roller, semi-circular roller, separation roller rotation)
(The original feed is started.)

∗ F Step 50: Transport clutch (DTC) OFF

∗ F When some originals are remaining in the paper exit section on completion of setting the originals, the remaining originals are discharged.

∗ F Step 51: Transport motor (DTM) forward rotation
Remaining originals are discharged.

Step 52: The original feed sensor (DFD) detects the lead edge of the original.
(DFD output: HIGH)

Step 53: The original is stopped by the resist roller.
Paper feed motor (DFM) OFF

Step 54: Paper feed motor (DFM) forward rotation
(Resist roller rotation)
The lead edge of the original is taken up by the resist roller.

Step 55: The original width sensor (DWS) detects the original width.

Step 56: Paper feed motor (DFM) OFF
(The original is stopped with the lead edge taken up by the resist roller.

↓

∗ F Step 57: Reverse original sensor (RDD) senses the rear edge of the discharged original. (RDD output: HIGH)

∗ F Step 58: Transport motor (DTM) rpm falls.

∗ F Step 59: Original discharge

∗ F Step 60: Transport motor (DTM) OFF (Transport belt, reverse roller, paper exit roller stop)

∗ F Step 61: Brake clutch (DTBC) OFF

∗ F Step 62: Transport clutch (DTC) ON

Step 63: The copier mirror base scanning is stopped.

↳ Go to Step 38.

(Discharge)

Step 64: Transport motor (DTM) forward rotation.

Step 65: Reverse original sensor (RDD) senses the rear edge of the discharged original.

Step 66: Transport motor (DTM) rpm falls.

Step 67: Original discharge

Step 68: Transport motor (DTM) OFF (Transport belt, reverse roller, paper exit roller stop)

Step 69: Transport clutch (DTC) OFF

End

∗ F Step 70: Transport clutch (DTC) OFF (Transport belt, reverse roller, paper exit roller rotation)

∗ F When some originals are remaining in the paper exit section on completion of setting the originals, the remaining originals are discharged.

∗ F Step 71: Transport motor (DTM) forward rotation
Remaining originals are discharged.

∗ F Step 72: Reverse original sensor (RDD) senses the rear edge of the discharged original. (RDD output: HIGH)

∗ F Step 73: Transport motor (DTM) rpm falls.

∗ F Step 74: Original discharge

∗ F Step 75: Transport motor (DTM) OFF (Transport roller, reverse roller, paper exit roller stop)

∗ F Step 76: Brake clutch (DTBC) OFF

∗ F Step 77: Transport clutch (DTC) ON

Step 78: The copier mirror base scan is stopped.

↳ Go to Step 64.

NOTE:
- ∗ A: This operation is performed when there is an original on the original table in advance. If there is no original on the original table, this operation is not performed.
- ∗ B: This operation is performed when there is no original on the original tray.
- ∗ C: Speed is reduced in the thin paper mode.
- ∗ D: Switchback is not performed in the thin paper mode.
- ∗ E: When there are some originals on the original tray, the original set sensor (DSD) output becomes LOW.
- ∗ F: When some originals are remaining in the paper exit section on completion of setting the originals, the remaining originals are discharged.

## 2) RADF (duplex mode) copy in the SF-A55

START

Step 01: The transport section is closed. (AUOD ON)

Step 02: Originals are set on the original tray. (DSD output: LOW)

Step 03: Original feed display ON

Step 04: Print SW ON

(Preliminary paper feed): For the first original, dummy paper exit is performed.

Step 05: Paper feed motor (DTC) reverse rotation
(Paper feed roller, semi-circular roller, separation belt rotation)
Since the stopper is up, paper is not fed.)

Step 06: Transport clutch (DTC) ON

Step 07: Transport motor (DTM) forward rotation
(Transport roller, reverse roller, paper exit roller rotation)

∗ A: If there is an original on the original table in advance, the original is discharged.

Step 08: Paper feed solenoid (DFSOL) ON
(The weight plate falls to press the original onto the semi-circular roller.)
Shutter solenoid (SSOL) ON
(the stopper falls.)

∗ A Step 09: Reverse original sensor (RDD) senses the rear edge of the discharged original.
(RDD output: LOW)

∗ A Step 10: Transport motor (DTM) rpm falls.

Step 11: Original fed sensor (DFD) detects the lead edge of the original.
(DFD output: HIGH)

Step 12: The original is stopped by the resist roller.
(Resist roller rotation)
The lead edge of the original is taken up by the resist roller.

Step 13: The original width sensor (DWS) senses the original width.

Step 14: Paper feed motor (DFM) OFF
(The original is stopped with the lead edge taken up by the resist roller.)

∗ A Step 15: Reverse original sensor (RDD) senses the rear edge of the discharged original.
(RDD output: HIGH)

∗ A Step 16: Original discharge

Step 17: Transport motor (DTM) OFF
(Transport roller, reverse roller, paper exit roller stop)
(Reverse paper feed)

Step 18: Transport motor (DTM) forward rotation
(Transport roller, reverse roller, paper exit roller rotation)

Step 19: Paper feed motor (DFM) forward rotation
(Resist roller rotation)
The original is fed to the transport section.

∗ B Step 20: Shutter solenoid (SSOL) OFF
(The stopper rises.)
The paper feed solenoid (DFSOL) OFF
(The weight plate rises.)

∗ B: If there is no original on the original tray, the stopper and the weight plate are lifted.

Step 21: Timing sensor (DTD) senses the rear edge of the original.
(DTD output: HIGH)

Step 22: Original width sensor (DWS) output LOW

Step 23: Paper feed motor (DFM) OFF
(Resist roller stop)

Step 24: Reverse solenoid (DRSOL) ON
(The flapper rises.)

Step 25: Reverse original sensor (RDD) senses the lead edge of the original.
(RDD output LOW)

Step 26: The original lead edge is directed toward the reverse direction by the flapper.

Step 27: Transport motor (DTM) OFF
(Transport roller, reverse roller, paper exit roller stop)

Step 28: Transport motor (DTM) reverse rotation
(Transport roller, reverse roller, paper exit roller rotation)
The original is fed in the paper feed direction.

Step 29: Reverse original sensor (RDD) senses the rear edge of the reversed original.
(RDD output : HIGH)

Step 30: The original is stopped by the original stopper.
Transport motor (DTM) OFF
(Transport roller, reverse roller, paper exit roller stop)

Step 31: Reverse solenoid (DRSOL) OFF
(The flapper falls.)

Step 32: Brake clutch (DTBC) ON

Step 33: Brake clutch (DTBC) OFF

Step 34: Transport clutch (DTC) OFF

Step 35: The copier mirror base scanning is started.

∗ C

DSD output

HIGH (No original on the tray) → AFter completion of scanning of the mirror base, go to Step 45.

LOW (Some original on the tray)

(Preliminary paper feed)

Step 36: Paper feed motor (DFM) reverse rotation
(Paper feed roller, semi-circular roller, separation belt rotation)
The original is fed.

Step 37: The original feed sensor (DFD) senses the lead edge of the original.
(DFD output: HIGH)

Step 38: The original is stopped by the resist roller.
Paper feed motor (DFM) OFF

Step 39: paper feed motor (DFM) forward rotation
(Resist roller rotation)
The lead edge of the original is taken up by the resist roller.

Step 40: Original width sensor (DWS) senses the original width.

Step 41: Paper feed motor (DFM) OFF
(The original is stopped with the lead edge taken up with the resist roller.)

Step 42: The copier mirror base scanning is stopped.

(Reverse feed)

Step 43: Transport clutch (DTC) ON

Step 44: Reverse solenoid (DRSOL) ON
(The flapper rises.)

Step 45: Transport motor (DTM) forward rotation
(Transport roller, reverse roller, paper exit roller rotation)

Step 46: Reverse original sensor (RDD) senses the lead edge of the original.
(RDD output : LOW)

Step 47: The original lead edge is directed to the reverse direction by the flapper.

Step 48: Transport motor (DTM) OFF
(Transport roller, reverse roller, paper exit roller stop)

Step 49: The original lead edge is directed toward the reverse direction by the flapper.

Step 50: Transport motor (DTM) OFF
(Transport roller, reverse roller, paper exit roller stop)

Step 51: Transport motor (DTM) reverse rotation
(Transport roller, reverse roller, paper exit roller rotation)
The original is fed in the paper feed direction.

Step 52: The reverse original sensor (RDD) senses the rear edge of the reversed original.
(RDD output : HIGH)

Step 53: The original is stopped by the original stopper.
Transport motor (DTM) OFF
(Transport roller, reverse roller, paper exit roller stop)

Step 54: Reverse solenoid (DRSOL) OFF
(The flapper falls.)

Step 55: Brake clutch (DTBC) ON

Step 56: Brake clutch (DTBC) OFF

Step 57: Transport clutch (DTC) OFF

Step 58: The copier mirror base scanning is started.

Step 59: The copier mirror base scanning is stopped.

∗ D

First discharge original

NO → After completion of the mirror base scanning, go to Step 85.

YES

(Discharge, paper feed, reverse)

Step 60: Transport clutch (DTC) ON

Step 61: Transport motor (DTM) forward rotation
(Transport roller, reverse roller, paper exit roller rotation)

Step 62: Paper feed motor (DFM) forward rotation (resist roller rotation)
The original is fed to the transport section.

∗ B Step 63: Shutter solenoid (SSOL) OFF
(The stopper rises.)
Paper feed solenoid (DFSOL) OFF
(The weight plate rises.)

∗ B If there is no original on the original tray, the stopper and the weight plate are lifted.

Step 64: Reverse original sensor (RDD) sense the lead edge of the discharged original.
(RDD output: HIGH)

Step 65: Timing sensor (DTD) senses the rear edge of the original.
(DTD output: LOW)

Step 66: Paper feed motor (DFM) OFF
(Resist roller stop)

Step 67: Original width sensor (DWS) output LOW

Step 68: Reverse original sensor (RDD) senses the rear edge of the discharged original.
(RDD output: HIGH)

Step 69: Transport motor (DTM) rpm falls.

Step 70: Reverse solenoid (DRSOL) ON
(The flapper rises.)

Step 71: Original discharge

Step 72: Transport motor (DTM) rpm rises.

Step 73: Reverse original sensor (RDD) senses the lead edge of the original.
(RDD output: LOW)

Step 74: The original lead edge is directed toward the reverse direction by the flapper.

Step 75: Transport motor (DTM) OFF
(Transport roller, reverse roller, paper exit roller stop)

Step 76: The original lead edge is directed toward the reverse direction by the flapper.

Step 77: Transport motor (DTM) OFF
(Transport roller, reverse roller, paper exit roller stop)

Step 78: Transport motor (DTM) reverse rotation
(Transport roller, reverse roller, paper exit roller rotation)
The original is fed to the transport section.

Step 79: Reverse original sensor (RDD) senses the rear edge of the reversed original.
(RDD output: HIGH)

Step 80: The original is stopped by the original stopper.
Transport motor (DTM) OFF
(Transport roller, reverse roller, paper exit roller stop)

Step 81: Reverse solenoid (DRSOL) OFF
(The flapper falls.)

Step 82: Brake clutch (DTBC) ON

Step 83: Brake clutch (DTBC) OFF

Step 84: Transport clutch (DTC) OFF

Step 85: The copier mirror base scanning is started.

∗ C DSD output: HIGH (No original on the tray) → After completion of mirror base scanning, go to step 43.

LOW (Some original on the tray)
↓
→ Go to Step 36.

(Discharge)

Step 86: Transport clutch (DTC) ON

Step 87: Transport motor (DTM) forward rotation
(Transport roller, reverse roller, paper exit roller rotation)

Step 88: Reverse original rotation (RDD) senses the rear edge of the discharged original.
(RDD output: HIGH)

Step 89: Transport motor (DTM) rpm falls.

Step 90: Original discharge

Step 91: Transport motor (DTM) OFF
(Transport roller, reverse roller, paper exit roller stop)

Step 92: Transport clutch (DTC) OFF

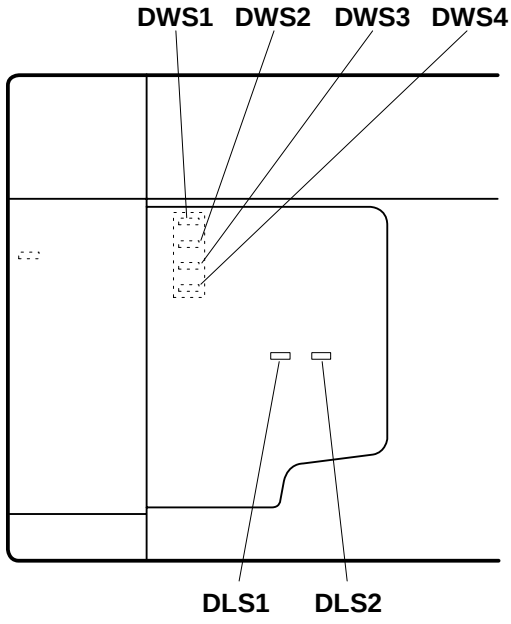
END

NOTE
- ∗ A: This operation is performed when there is an original on the original table in advance. If there is no original on the original table, this operation is not performed.
- ∗ B: This operation is performed when there is no original on the original tray.
- ∗ C: If there is any original on the original tray, the original set sensor (DSD) output becomes LOW.
- ∗ D: Depends on whether there is an original fed by Step 36 ~ Step 42 or not.

## C. Detection of document size

Document size is sensed in either of three ways, which correspond to a different operation.

1) Sensing of document size by the document set tray
   Sensing of document sizing in the document set tray is used, in automatic paper size and automatic magnification selection mode, in order to recognize the document size when document is set on the document tray, enabling the automatic selection of paper size and magnification ratio of copy.
   When a document is comprising sheets of different sizes are set, this sensing method recognizes the largest sheet as the document size, which is determined by the width measured by the document width sensors (DWS1 ~ DWS4) and the length measured by the document length sensors (DLS1, DLS2).
   Document size is determined in the timing of document sensing by the document set sensor (DSD).




Sensor status by document size

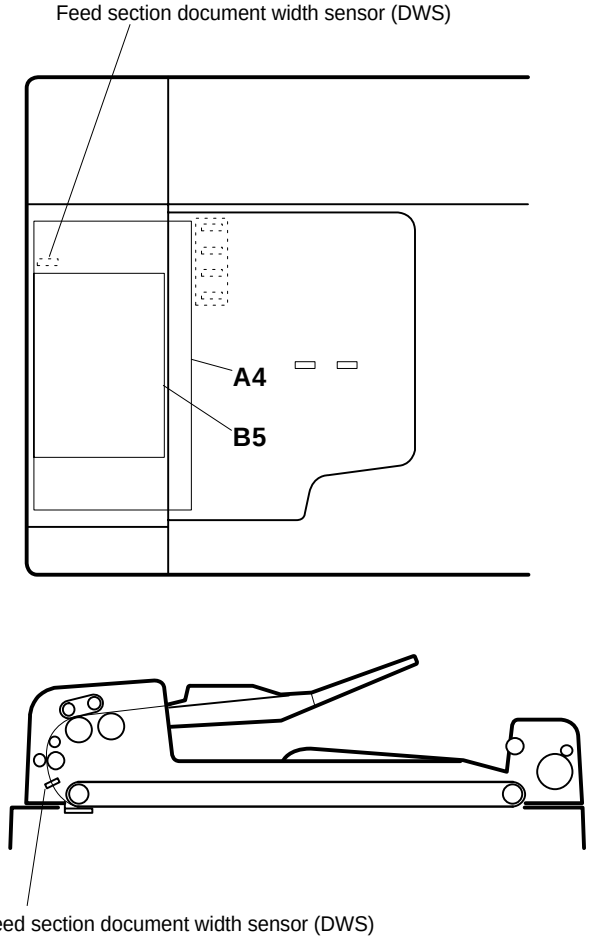
| | Document size, setting orientation | ○: ON or L output (sensed)<br>●: OFF or H output | | | | | |
|---|---|---|---|---|---|---|---|
| | | DWS1 | DWS2 | DWS3 | DWS4 | DLS1 | DLS2 |
| A/B standard | A5 | ● | ● | ○ | ● | ● | — |
| | A4 | ○ | ● | ● | ● | ● | — |
| | B5 | ● | ○ | ● | ● | ● | — |
| | A4R | ● | ● | ○ | ● | ○ | — |
| | B5R | ● | ● | ● | ○ | ○ | — |
| | B4 | ● | ○ | ● | ● | ○ | — |
| | A3 | ○ | ● | ● | ● | ○ | — |
| Inch standard | 11" x 8.5" | ○ | — | ● | — | ● | ● |
| | 8.5" x 5.5" | ● | — | ○ | — | ● | ● |
| | 11" x 8.5"R | ● | — | ○ | — | ○ | ● |
| | 14" x 8.5 | ● | — | ○ | — | ○ | ○ |
| | 11" x 17" | ○ | — | ● | — | ○ | ○ |

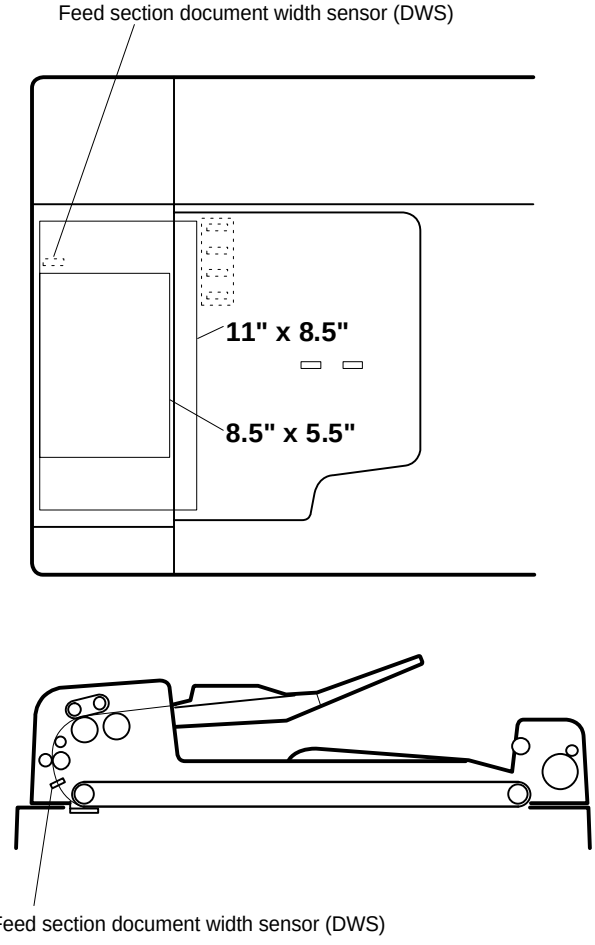
2) Sensing of document size by the document width sensor (DWS) in the feed section

Sensing of document size by the document width sensor is used, in automatic paper size and automatic magnification selection mode, to determine whether the document is A4 or A5 (11" x 8.5" or 8.5" x 5.5").

When a document comprising stacked sheets of different sizes is set in the document tray, the document size cannot be recognized by the sensors in the document tray. Therefore, this function is provided to sense the document size behind the resist roller after the feeding section has fed the document, as far as documents of A4 or A5 size (11" x 8.5" or 8.5" x 5.5") (laterally oriented) is concerned. Consequently, if A4- and A5-size (11" x 8.5" or 8.5" x 5.5") document sheets (laterally oriented) are stacked and set in the document tray, document size recognition by the document width sensor (DWS) in the feeding section is preferred over that of the sensor in the document tray.

When A4- and A5-size (11" x 8.5" or 8.5" x 5.5") document sheets (laterally oriented) are stacked and set in the document tray, the document length sensors (DSL1, DSL2) will not be actuated. Therefore, judgment can be made between A4 or A5, or 11" x 8.5" or 8.5" x 5.5" by sensing the document width with the document width sensor (DWS) in the feed section.




Status of feed section document width sensor (DWS)

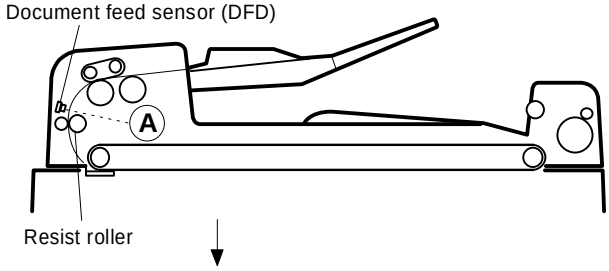
| Document size | ○: H output (sensed)<br>●: L output |
|---|---|
| A4 | ○ |
| A5 | ● |

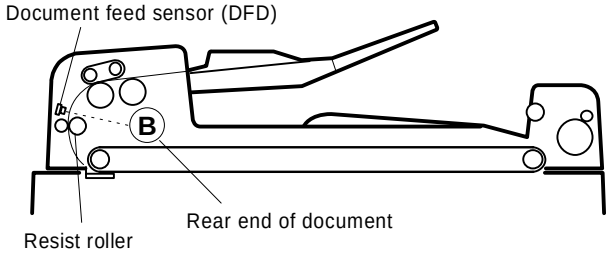
Status of feed section document width sensor (DWS)

| Document size | ○: H output (sensed)<br>●: L output |
|---|---|
| 11" x 8.5" | ○ |
| 8.5" x 5.5" | ● |

3) Sensing of document size by feed motor rotation sensor (DFMRS)
This function compensates for the inaccuracy of the document size recognition in the document tray when document sheets of different sizes are stacked in the document tray. Consequently, results of this function is preferred over the document size recognition in the document tray. The pulses of the slit disk rotation of the feed motor (DFM) are counted in the period before the rear end of document is sensed (DFD output H level) by the document feed sensor after the feed motor (DFM) has started CCW rotation, namely the resist roller has started to rotate and feeding of document from the feed section to the transfer section has started, to determine the document length.
Accuracy of sensing is improved by observing the document width as well with the document width sensor (DWS) in the feed section.

Resist roller starts rotation (feed of document from feed section to transfer section starts).



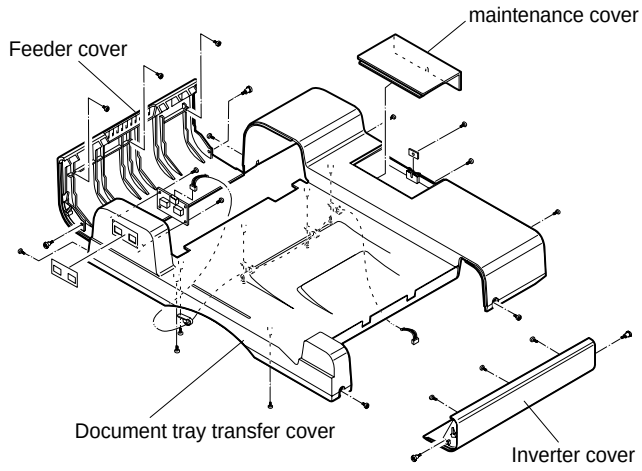

Feed motor rotation sensor (DFMRS) counts the number of rotations (No. of encoder pulses) of the feed motor (DFM) between Ⓐ and Ⓑ, to determine the document length.

# [6] DISASSEMBLY, ASSEMBLY AND ADJUSTMENT

∗ Descriptions in this chapter excludes simple disassembly and assembly operations. Refer to the parts guide for the disassembly and assembly of parts which are not explained here.

∗ Refer to the description in [7] CONNECTOR LAYOUT for the processing of the wiring during assembly.

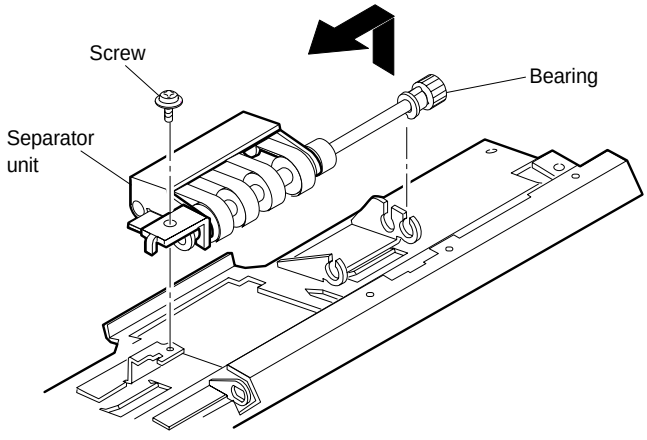
## 1. External components




## 2. Disassembly of the separator belt

a. Open the document feed cover.

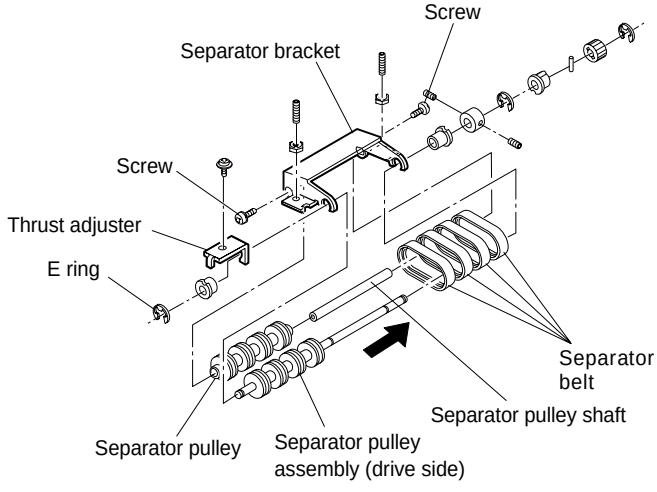
b. Unscrew the set screw and remove the separator unit by sliding it toward the front.
Note: The separator unit can be dismounted by sliding the unit in the direction of arrow and removing the bearing.




c. Unscrew two clamp screws and remove the separator pulley and the separator pulley shaft.

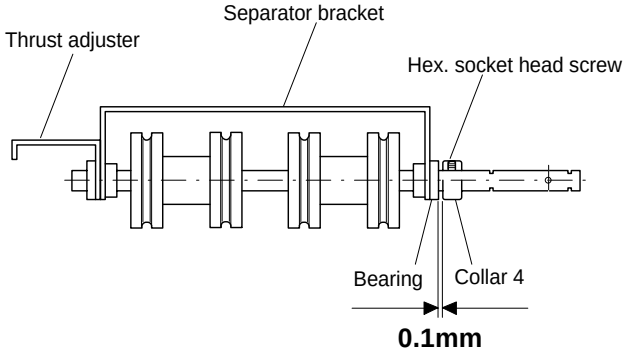
d. Remove the E ring, then remove the thrust adjuster and the bearing.

e. Remove the separator pulley assembly from the separator bracket by sliding it in the direction of the arrow, and remove the separator belts (4 pcs.).



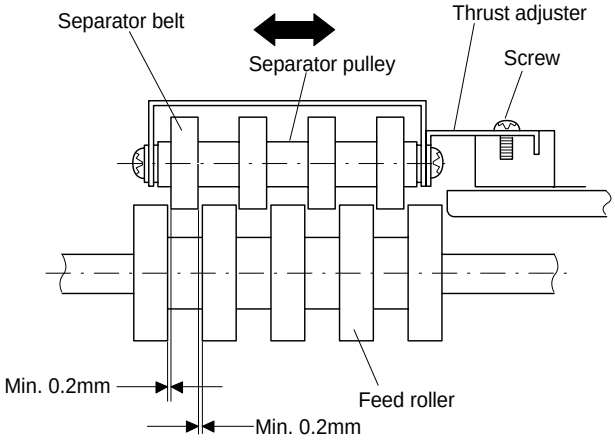
## 3. Mounting and adjustment of separator unit

① Mount the separator pulley assembly on the separator bracket while keeping a clearance of 0.1mm between the collar 4 and the bearing as shown below.
Secure the 0.1mm clearance by using a spacer of 0.1mm thick and clamping the collar 4 with a hex. socket head screw.




② Assembly of the separator unit

- Set the separator unit after adjusting it to the right or left so that a clearance of at least 0.2mm is secured between the feed roller and the separator belt.



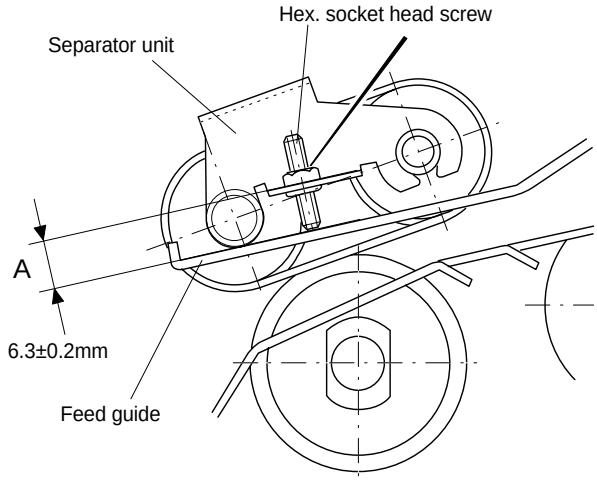

③ Adjustment of the transfer force of the separator unit

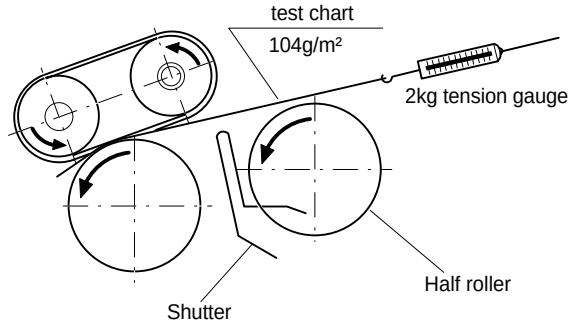
- Obtain transfer force of 850±150gf by adjusting with two hex. socket head screws in the separator unit.

### <Adjustment procedure>

1. Remove the gate spring (located beside the gate solenoid) and keep the gate lowered.
2. Adjust the half roller so that the test chart does not come into contact with the half roller.
3. Adjust the screw to make the dimension A (at two places) in the figure 6.3±0.2mm (reference value).
4. Adjust the screw so that the transfer force is 850±150gf while measuring with a tension gauge. Errors of the dimension A in the following figure on the front and rear sides should be within 0.5mm (@).

   (Note) When adjusting the transfer force, do not allow contact between the separation holder rubber and the paper feed roller.
5. After adjustment, lock the two hex. socket head screws with Three Bond.



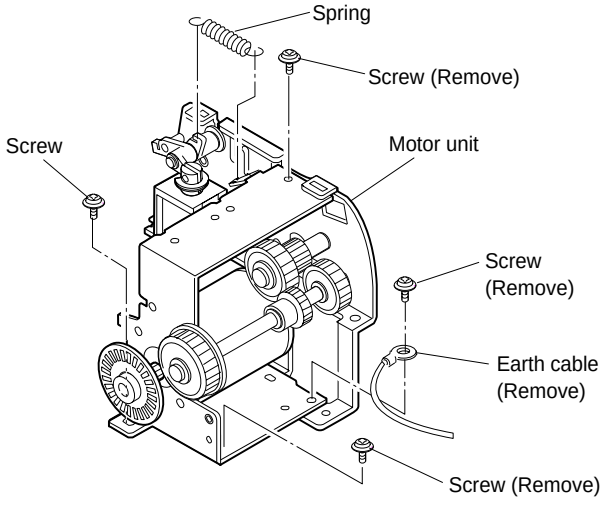

## 4. Dismounting the half roller and the feed roller

a. Remove the document tray and the transfer cover.

b. Open the document feed cover.

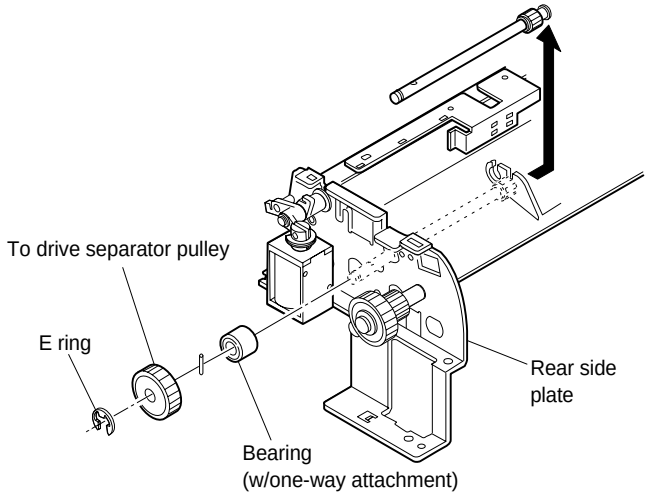
c. Remove the motor bracket clamp screws ( 4pcs.) and the earth cable.

d. Remove the spring, connector and cable band, to dismount the motor unit.

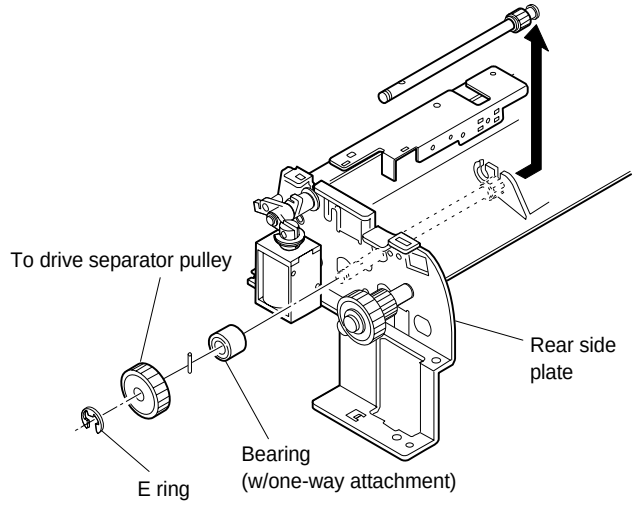


e. Remove the E ring, separator pulley drive gear and bearing (w/one-way attachment), and slide the shaft in the direction of arrow shown in the figure to remove it.

(Inch series)



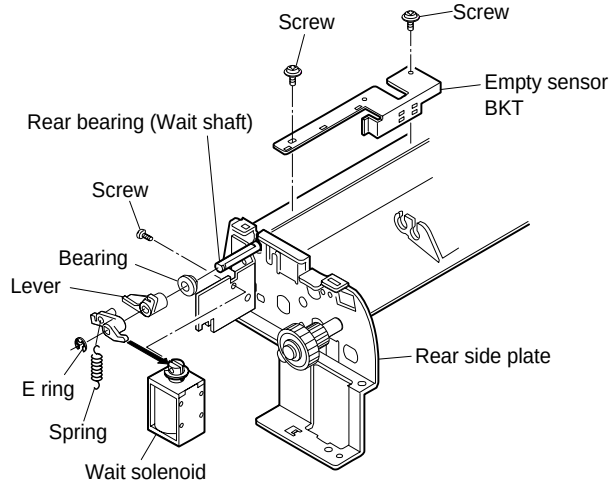

(AB series)



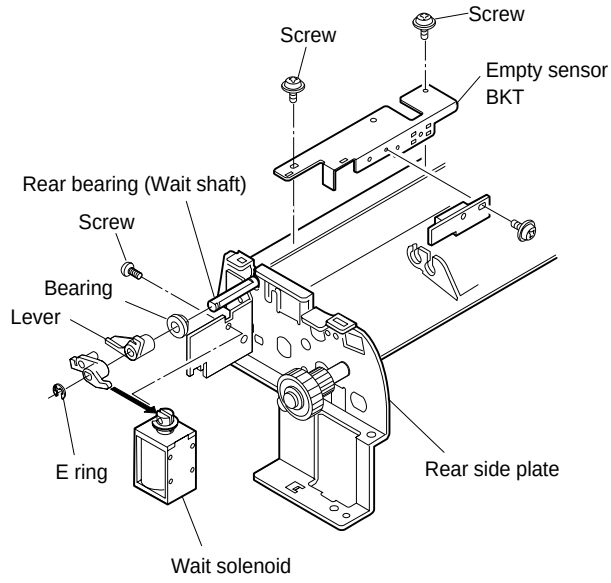

f. Remove the spring which is hooked on the wait solenoid lever and remove the E ring.

g. Unscrew the wait solenoid clamp screw and remove the plunger from the lever.

(Inch series)




(AB series)



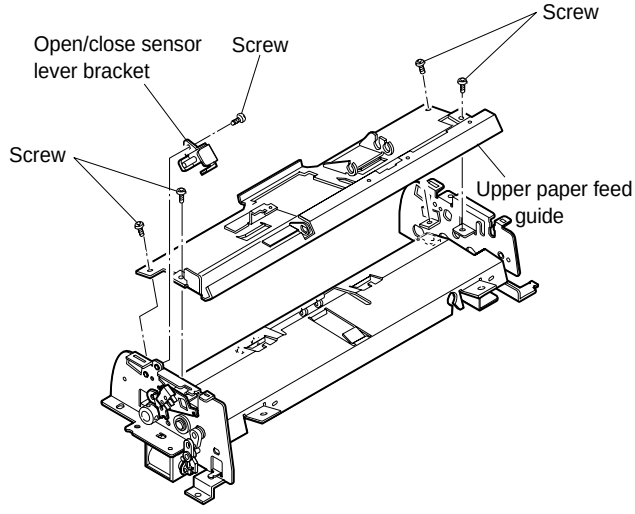

h. Remove the rear-side bearing of the wait shaft from the side plate.

i. Unscrew two screws to remove the empty sensor bracket.

<Note> For the AB series, remove the screw and the small bracket.

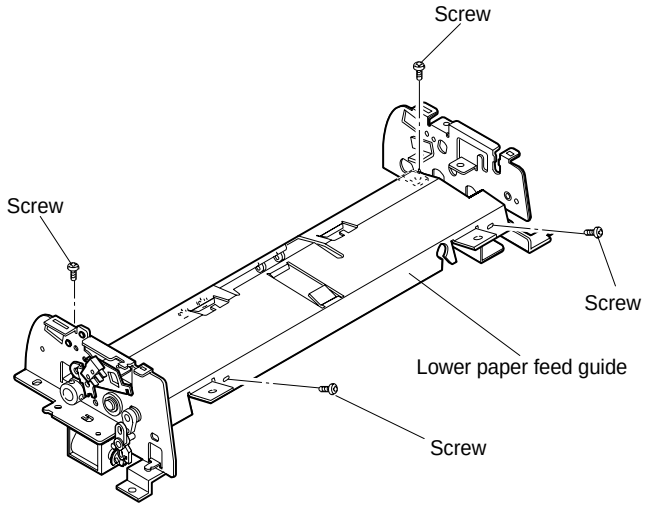
j. Unscrew the screw to remove the open/close sensor lever bracket.

k. Unscrew four screws to remove the upper paper feed guide.



l. Unscrew four screws to remove the lower paper feed guide.

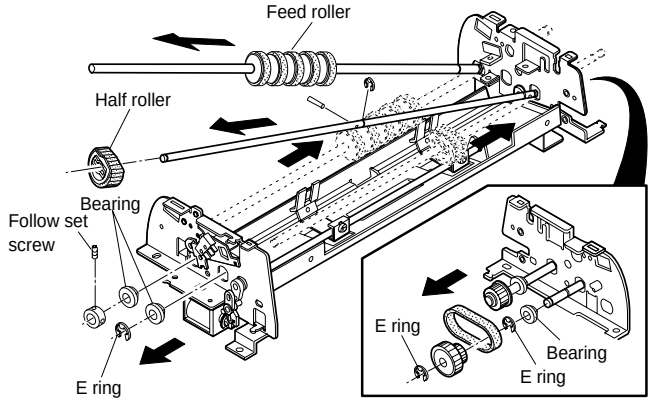
m. Unscrew the follow set screw to remove the front side collar of the feed roller shaft. On the rear side, remove the E ring and the bearing and switch back the feed roller shaft to remove it upward.




n. Remove the E ring and bearing from the front side plate side (@) of the half roller.

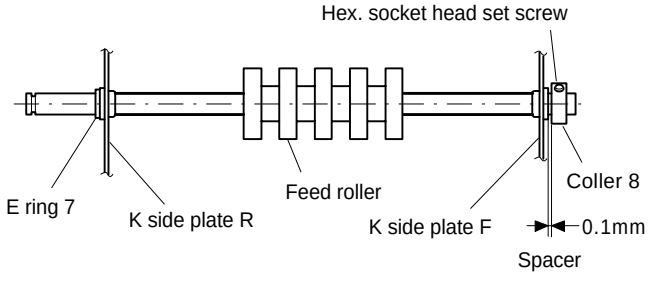
o. Slide the shaft to the rear side to remove the rear side bearing, and remove the front side by lifting up.

p. Remove the E ring of the half roller side, and remove the half roller.




## 5. Installation of feed roller

Set the feed roller by clamping the collar 8 with the hex. socket head set screw using a spacer of 0.1mm thickness.

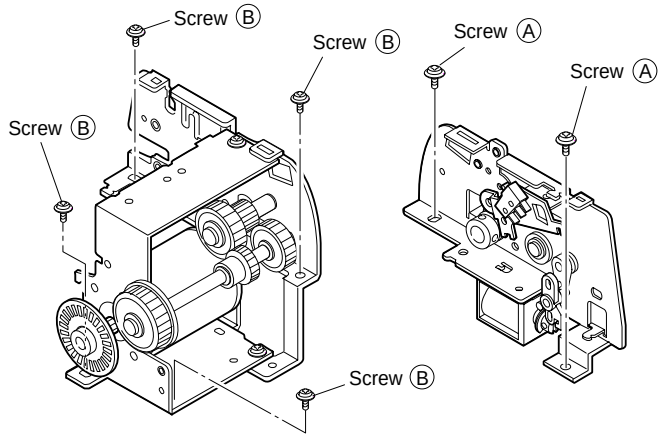



## 6. Removing the resist roller

① Remove the document tray and the transfer cover.

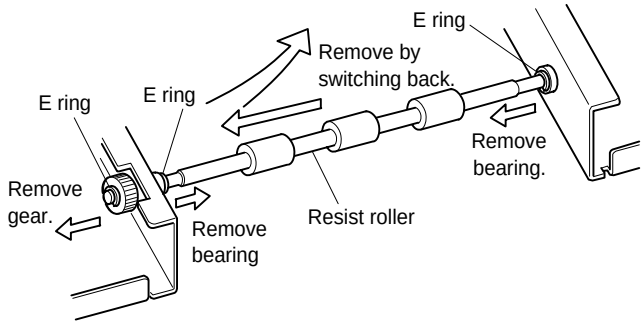
② Open the feed cover.

③ Remove two screws Ⓐ and four screws Ⓑ, and remove the feed unit.



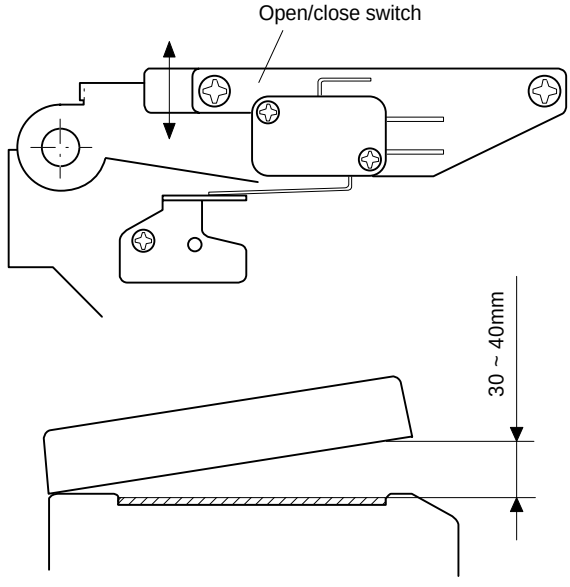

④ Remove three E rings and remove the gear and the bearing.

⑤ Switch back the resist roller and remove it by lifting upwards.



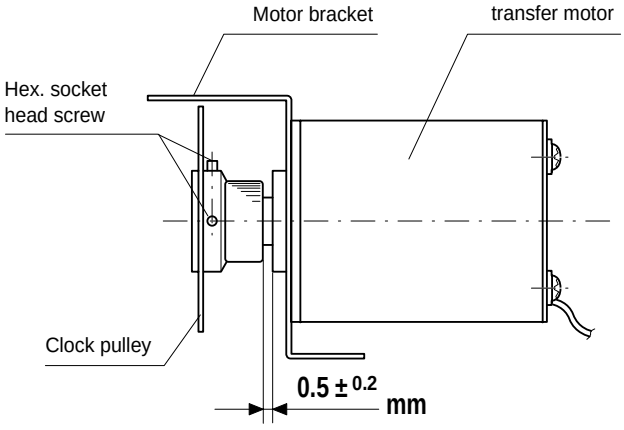

## 7. Mounting the open/close switch

Adjust the mount of the open/close switch assembly so that, as the DF is closed from its open position, the micro switch turns on when the distance between the glass surface and the DF spacer (front side) becomes 10 to 40mm.



## 8. Installation of inverting section, feed section clock pulleys

After securing the transfer motor on the motor bracket, set the clock pulley on the motor shaft. Clamp the clock pulley with two hex. socket head screws while securing a space of 0.5±0.2mm between the end faces of the pulley and the motor. The transfer motor shaft has two flat surfaces which are cut on the circumference at 90° space. Tighten the hex. socket head screws to rest on these flat surfaces.



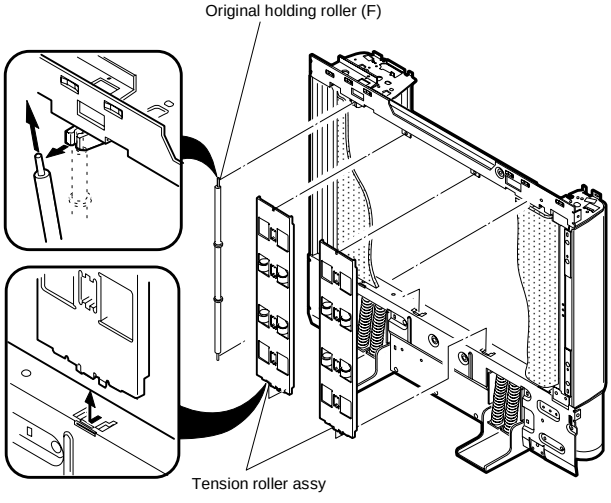

## 9. Replacement of the document feed belt

a. Remove the original loading table and the original feed cover.

b. Set the ADF in the following way.

NOTE: You must note the following points when the original feed belt is to be replaced with the ADF installed to the copier.

- Do not harm the glass surface of the original table.
- Unplug the power supply cable from the wall outlet.

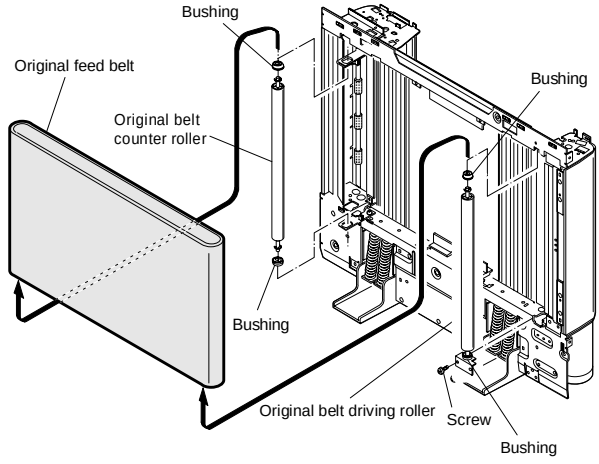



c. Remove two screws and remove the two tension roller assys.

d. Remove the original holding roller (F) from the roller holder.

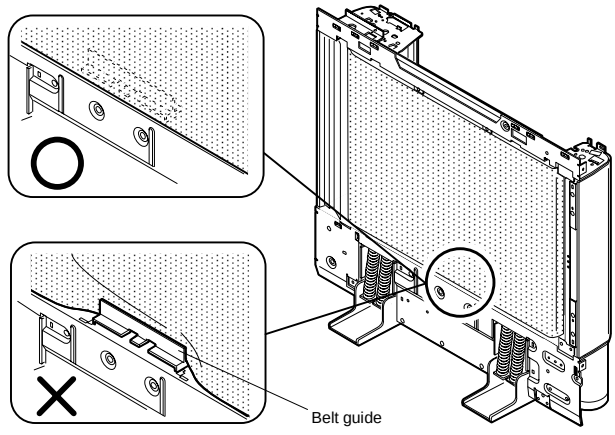
e. Remove the screw and remove the original belt driving roller and the bushing.

f. Remove the two original belt counter roller assys, and the original feed belt.



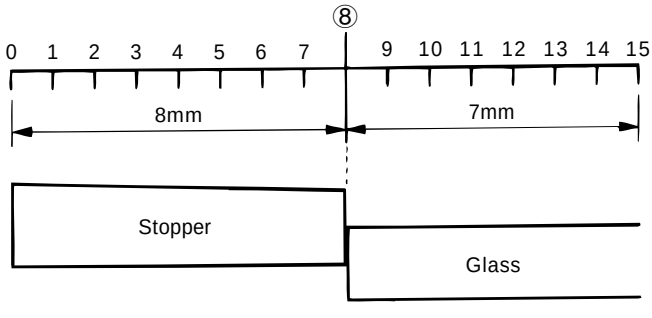

**Tips when re-assembling**

- Do the reverse sequence of disassembly to re-assemble it.
- Refer to the above figure to install four bushings on the roller.
- After the original feed belt has been installed, make sure that the belt guide resides in the original feed belt.




## 10. Original lead edge position adjustment.

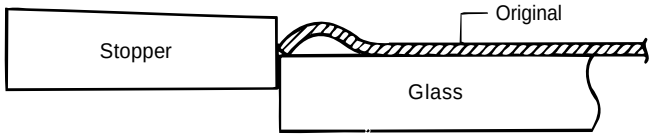
- The original lead edge position for RADF can be determined using the test command 53.
- For it had been factory set that the lead edge should stop on the location 8, but it may be needed to make adjustment. It can be adjusted within a range of 8mm (8 steps) at the stopper side and 7mm (7 steps) at the glass side. Adjustment can be done for each mode of single sided, double sided, and light weight paper.



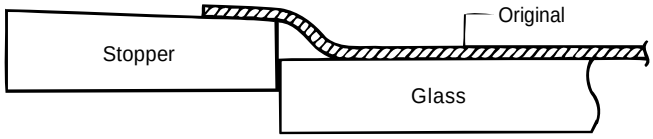
• **Setup example**

(1) If the lead edge of the original was still not to the stopper, enter an optimum value.

(2) If the image at the lead edge of the original were to deform, enter an optimum value to move to the glass side.




(3) If the original were to override the stopper, enter an optimum value to move it to the glass side.



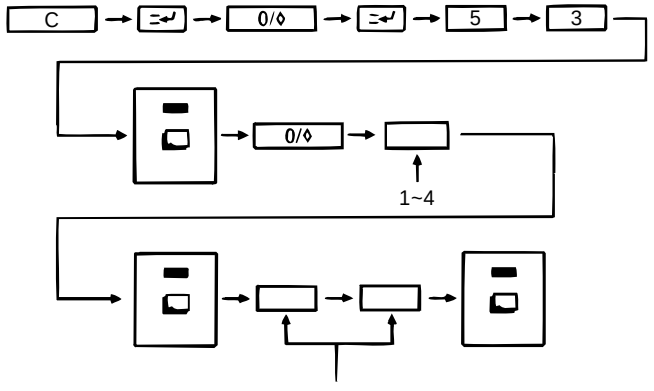

After finished selecting settings using test command 53; the screen shown in the illustration bellow will appear. Select one of the numbers from this screen then use the 10-key pad to enter a setting for items #1 through #15.

SIMULATION No. 53

01 ~ 04: ORIGINAL STOP POINT SETUP.

| | NOM ☐ | THIN ☐ | SIMP | DUP |
|---|---|---|---|---|
| 1 | * | | * | |
| 2 | * | | | * |
| 3 | | * | * | |
| 4 | | * | | * |

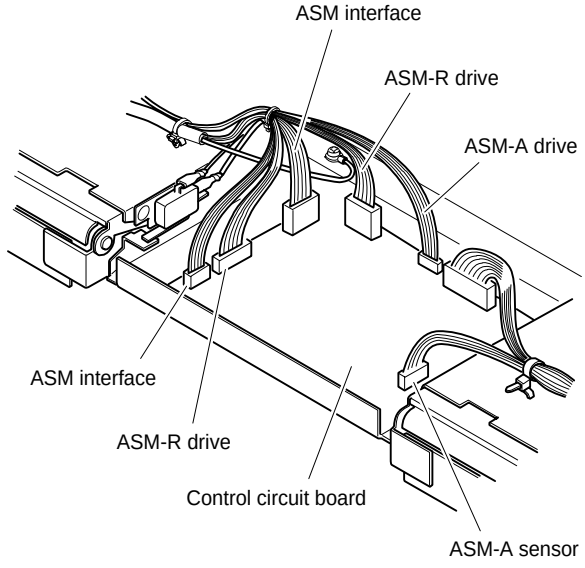
05 ~ 06: (NO PROGRAM)
07 ~ 10: RADF SENSOR ADJUSTMENT.
07.REGIST 08.TIMING
09.EXIT REVERSAL 10.EMPTY



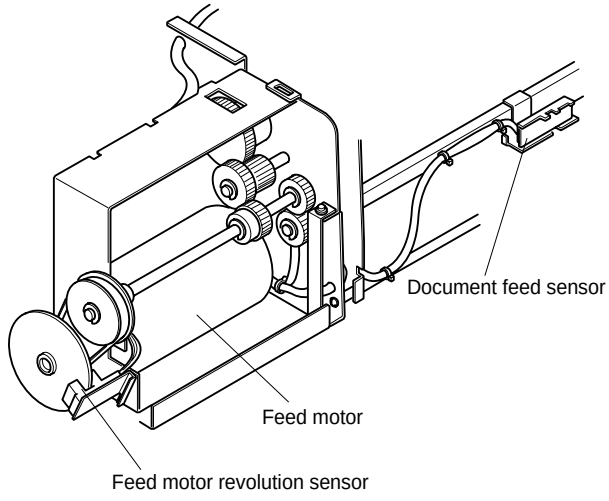

Set to between 0 and 15 as dictated by the copier's performance.
The factory setting is "8".

# [7] CONNECTOR LAYOUT

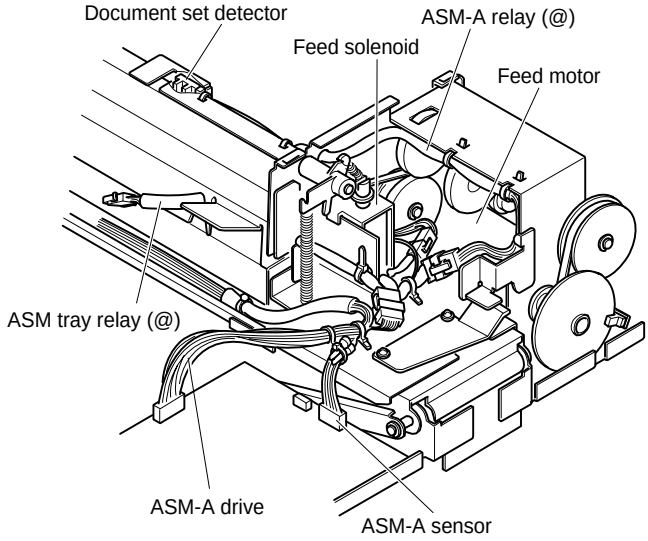
## 1. Connections around control circuit board



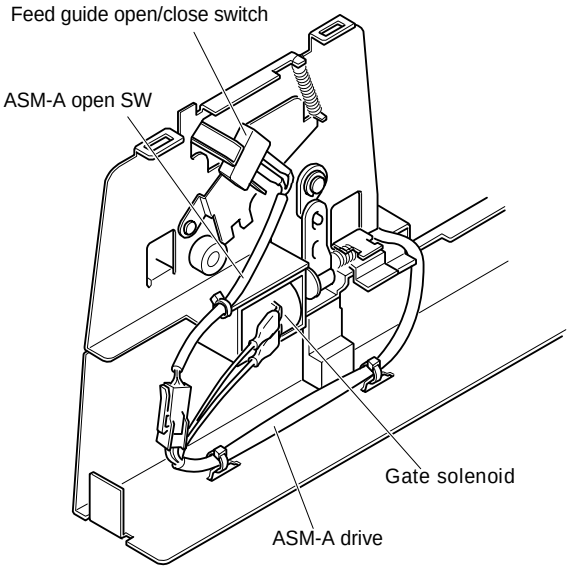

## 2. Connections around feed motor



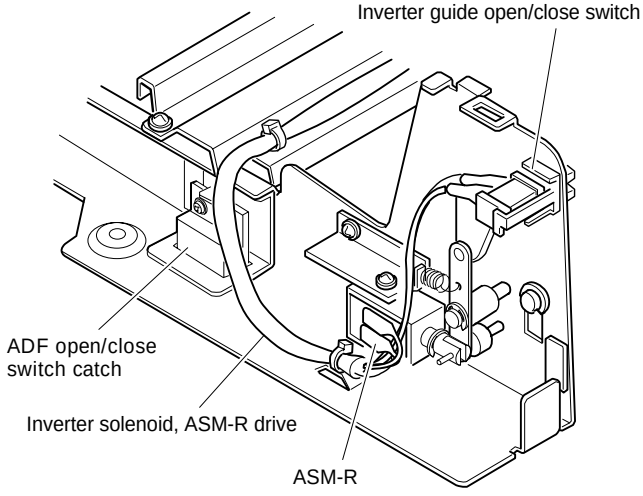

## 3. Connections in feed section



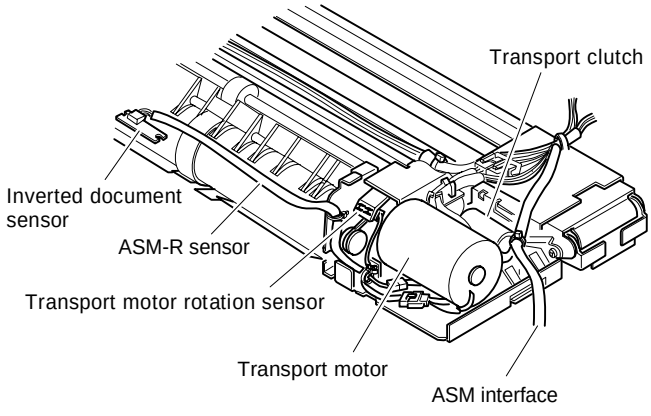
## 4. Connection in feed section (Front side)




## 5. Invertor exit section (Front side)



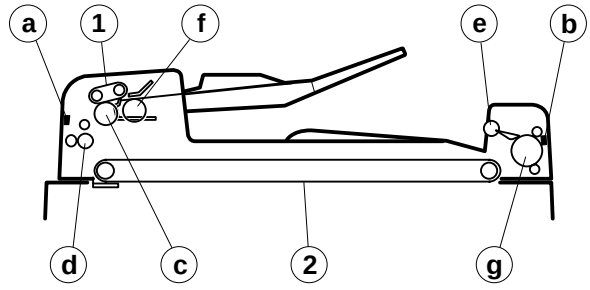

## 6. Invertor exit section




# [8] MAINTENANCE

## 1. Replacement parts

| DWG No. | Part name |
|---|---|
| ① | Separator belt |
| ② | Transfer belt |




## 2. Maintenance parts

Clean the following parts in the specified methods during maintenance service.

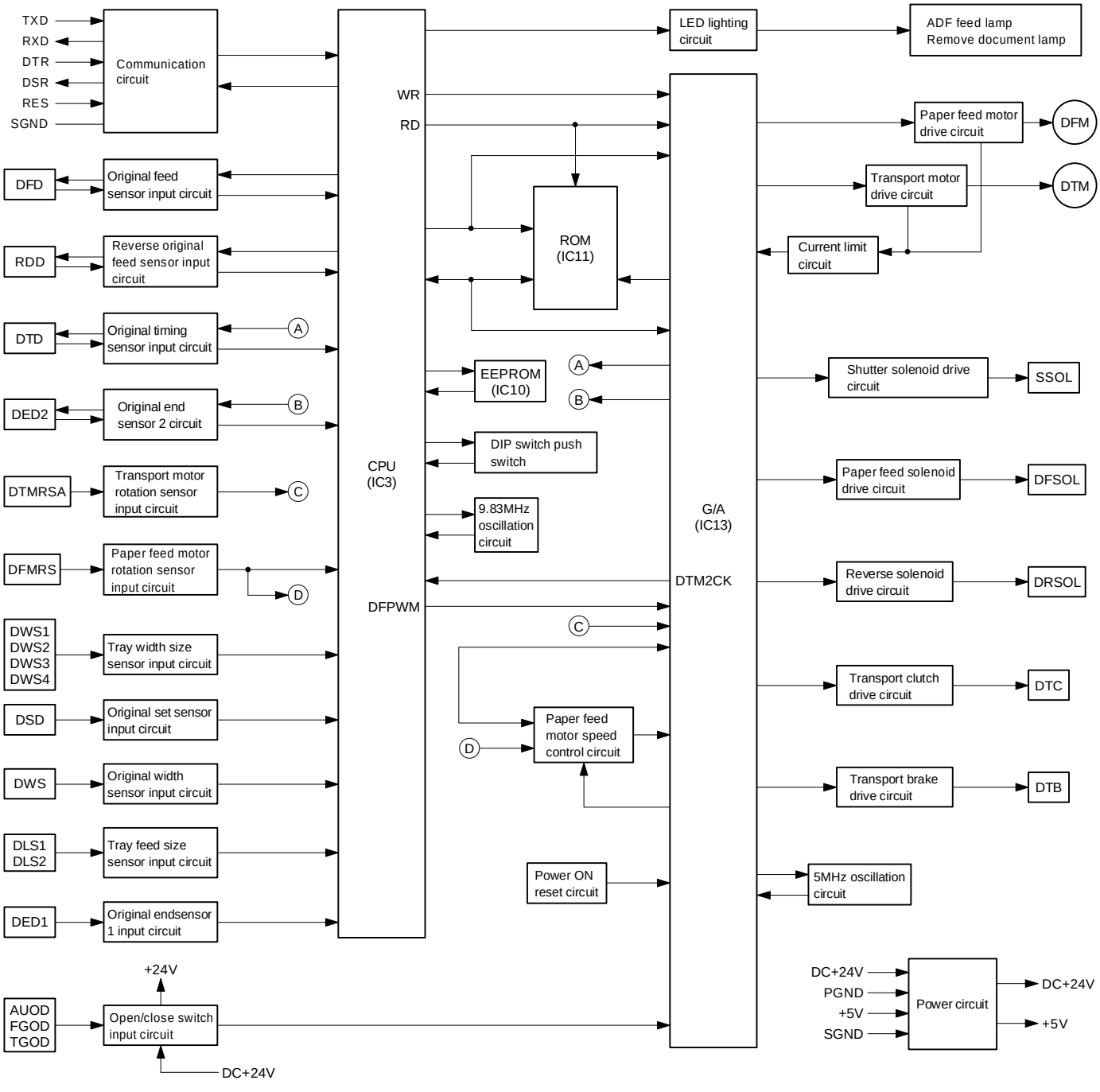
| Symbol | Part name | Maintenance method |
|---|---|---|
| ⓐ | Document feed sensor | Blow off |
| ⓑ | Inverted document sensor | Blow off |
| ⓒ | Feed roller | Wipe with alcohol |
| ⓓ | Resist roller | Wipe with alcohol |
| ⓔ | Discharge roller | Wipe with alcohol |
| ⓕ | Half roller | Wipe with alcohol |
| ⓖ | Inverter roller | Wipe with alcohol |

# [9] CIRCUIT DESCRIPTIONS

## 1. General

This circuit controls feeding, transporting, stopping, and reversing of the original. It is composed of sensors, switches, the circuit which processes signals from the copier PPC, the circuit which drives motors, solenoids, and clutches, the CPU, the G/A and it peripheral circuits.

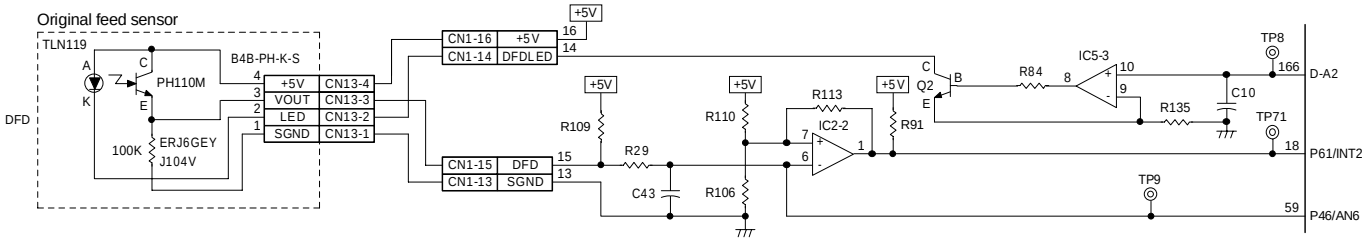
## 2. Block diagram



# 3. Operational descriptions

## A. Sensor/detector input circuit

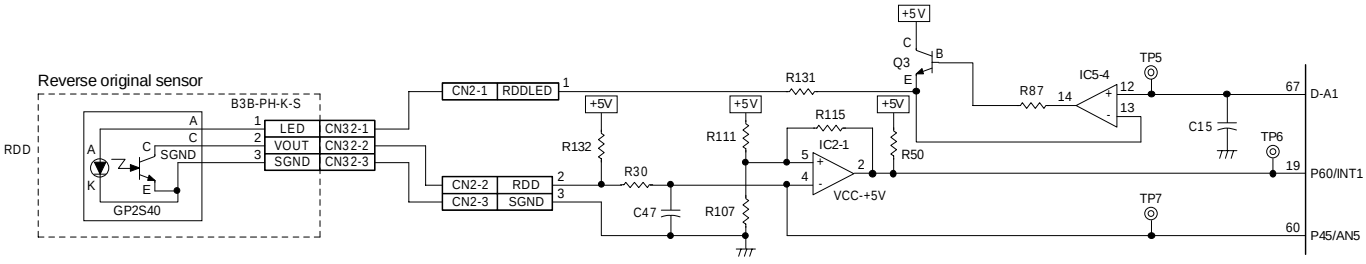
### [a] Original feed sensor (DFD)




**Original feed sensor input circuit**

The original feed sensor is of the reflection type, and is composed of the LED and the photo transistor. Infrared light emitted from the LED is reflected by the original to the photo transistor to increase the photo current in the photo transistor, detecting "original presence." This circuit is provided with the automatic adjustment feature. The LED cathode is connected to the voltage-current conversion circuit which is composed of the operation amplifier (IC5), Q2, and R135. It controls the current value by the D-A output (analog voltage output) of the CPU. That is, the CPU D-A output value (66 pin) is always made equal to the input voltage of IC5 9 pin (the voltage drop of the LED current by R135). Therefore, by changing the D-A output value, the current value is changed accordingly.
On the other hand, the photo current of the photo transistor is converted into a voltage by the emitter resistance in the sensor PWB, and is passed through the noise filter composed of R29 and C43 to IC2 6 pin and CPU 59 pin. R106, R110, R113, and IC2 form the voltage comparator, which compares the input voltage from the sensor and the threshold voltage (about 2V) generated by dividing +5V with R106 and R110. When the input voltage from the sensor exceeds the threshold voltage, the IC2 1 pin output is driven to LOW and is inputted to the CPU 18 pin as the "original present" signal. The CPU 59 pin is an A-D input pin which can convert an analog voltage into a digital value in the CPU.
On the extension of the sensor optical axis, there is the background plate which has lower reflection rate than the original has. This background plate reflects the light to provide the emitter voltage of the photo transistor, which serves as the reference voltage of "original absent." Since there are some variations in the sensor sensitivities, the voltage of "original absent" is used as the reference voltage for automatic adjustment of the sensor sensitivity. That is, the sensor voltage of "original absent" is A-D inputted and the D-A output voltage is changed to change the LED current (LED light quantity). Then the CPU controls the sensor voltage to the constant level. The D-A output value is unique to each element, and its value is stored in the EEPROM (IC10).

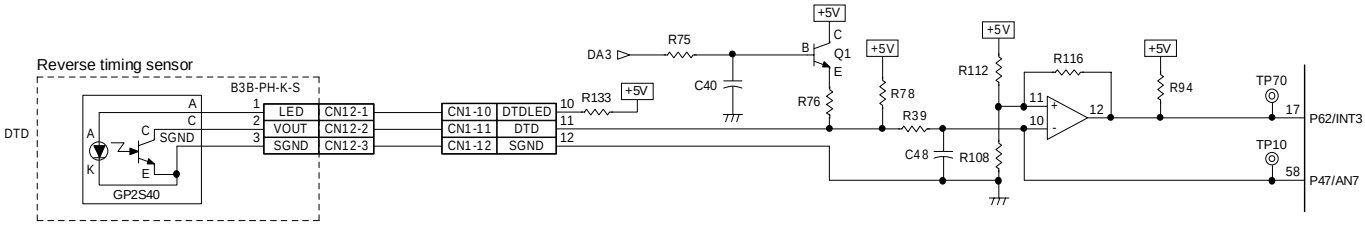
### [b] Reverse original sensor (RDD)




**Reverse original sensor input circuit**

The reverse original sensor is of the reflection type, and is integrated with the LED and the photo transistor. Infrared light emitted from the LED is reflected by the mirror and passed to the photo transistor to increase the photo current in the photo transistor, detecting "original absent." When, on the other hand, there is an original between the LED and the mirror, there is no reflection light from the mirror, no increase in the photo transistor photo current, detecting "original present." This circuit is provided with the automatic adjustment feature.
The LED anode is connected to the voltage-current conversion circuit composed of the operation amplifier (IC5), Q3 and R131. The current value is controlled by the CPU D-A output (analog voltage output). That is, the CPU D-A output value (67 pin) is always kept equal to the IC5 13 pin input voltage (the voltage drop of the LED current by R131). Therefore, by changing the D-A output value, the current value can be changed accordingly.
On the other hand, the photo current of the photo transistor is converted into a voltage value by the load resistor R132, and passed through the noise filter composed of R30 and C47 to IC2 4 pin and the CPU 60 pin. R107, R111, R115, and IC2 form the voltage comparator, which compares the input voltage from the sensor and the threshold voltage (about 2V) generated by dividing +5V with R107 and R111. When the sensor input voltage exceeds the threshold voltage, IC1 1 pin output is driven to LOW and passed to the CPU 19 pin as the "original present" signal. The CPU 60 pin is an A-D input pin, which converts an analog voltage into a digital value in the CPU.
Since there are some variations in the sensor sensitivities, the voltage of "original absent" is used as the reference voltage for automatic adjustment of the sensor sensitivity. That is, the sensor voltage of "original absent" is A-D inputted and the D-A output voltage is changed to change the LED current (LED light quantity). Then the CPU controls the sensor voltage to the constant level. The D-A output value is unique to each element, and its value is stored in the EEPROM (IC10).

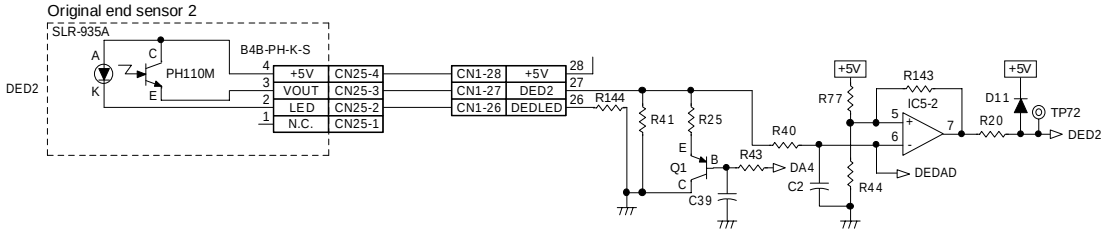
### [c] Original timing sensor (DTD)




**Reverse timing sensor input circuit**

The original timing sensor is of the reflection type, and is integrated with the LED and the photo transistor.
Infrared light emitted from the LED is reflected by the mirror and passed to the photo transistor to increase the photo current in the photo transistor, detecting "original absent." When, on the other hand, there is an original between the LED and the mirror, there is no reflection light from the mirror, no increase in the photo transistor photo current, detecting "original present." This circuit is provided with the automatic adjustment feature. The LED anode is connected to R133 to keep the current flowing through the LED constant.
On the other hand, the photo current of the photo transistor is converted into a voltage value by the load resistor R76 and R78, passed through the noise filter composed of R39 and C48 to IC2 10 pin and the CPU 58 pin. R108, R112, and IC2 form the voltage comparator, which compares the input voltage from the sensor and the threshold voltage (about 2V) generated by dividing +5V with R107 and R111. When the sensor input voltage exceeds the threshold voltage, IC2 13 pin output is driven to LOW and passed to the CPU 17 pin as the "original present" signal. The CPU 58 pin is an A-D input pin, which converts an analog voltage into a digital value in the CPU.
Since there are some variations in the sensor sensitivities, the voltage of "original absent" is used as the reference voltage for automatic adjustment of the sensor sensitivity. That is, the sensor voltage of "original absent" is A-D inputted and the D-A output voltage is changed to change the PWM outputted from G/A. Then the CPU controls the sensor voltage to the constant level, and the voltage is outputted from G/A. The PWM output value is unique to each element, and its value is stored in the EEPROM (IC10).

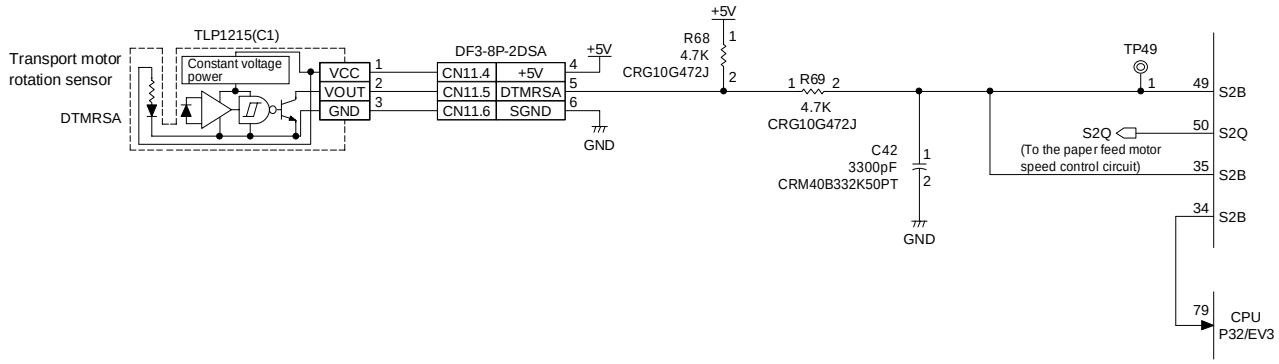
### [d] Original end sensor 2 (DED2)



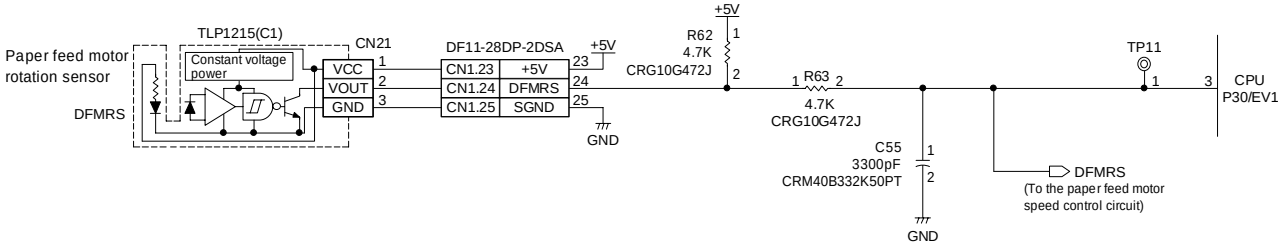

**Orignal end sensor 2 input circuit**

The original end sensor 2 is the reflection sensor, and is integrated with the LED and the photo transistor.
Infrared light emitted from the LED is reflected by the mirror and passed to the photo transistor to increase the photo current in the photo transistor, detecting "original absent." When, on the other hand, there is an original between the LED and the mirror, there is no reflection light from the mirror, no increase in the photo transistor photo current, detecting "original present." This circuit is provided with the automatic adjustment feature. The LED cathode is connected to R144 to keep the current flowing through the LED constant.
On the other hand, the photo current of the photo transistor is converted into a voltage value by the load resistor R25 and R41, passed through the noise filter composed of R40 and C2 to IC5 6 pin and the CPU 62 pin. R44, R77, and IC5 form the voltage comparator, which compares the input voltage from the sensor and the threshold voltage (about 2V) generated by dividing +5V with R44 and R77. When the sensor input voltage exceeds the threshold voltage, IC5 7 pin output is driven to LOW and passed to the CPU 43 pin as the "original present" signal. The CPU 62 pin is an A-D input pin, which converts an analog voltage into a digital value in the CPU.
Since there are some variations in the sensor sensitivities, the voltage of "original absent" is used as the reference voltage for automatic adjustment of the sensor sensitivity. That is, the sensor voltage of "original absent" is A-D inputted and the PWM from G/A is changed to change the photo transistor light quantity. Then the CPU controls the sensor voltage to the constant level, and the voltage is outputted from G/A. The PWM output value is unique to each element, and its value is stored in the EEPROM (IC10).

### [e] Paper feed motor rotation sensor (DFMRS), transport motor rotation sensor (DTMRSA) input circuit



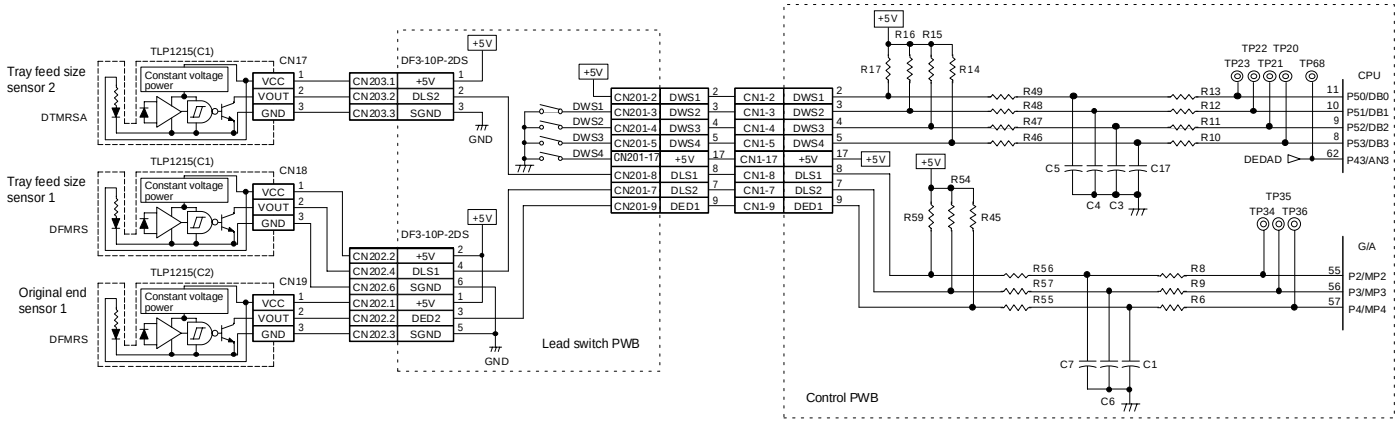

**Transport motor rotation sensor input circuit**




**Paper feed motor rotation sensor input circuit**

This sensor senses rotation of the paper feed motor and the transport motor. It is composed of the photo interrupter with a built-in amplifier and the slit disc attached to the motor shaft. Pulse signals are provided according to the motor rotation. The frequency of the pulse signal is used to detect the motor speed. By counting the number of pulses, the motor rotation amount is
detected. Either sensor has the similar input section, and the signals are processed by the noise filter composed of R63 (R69) and C55 (C42).

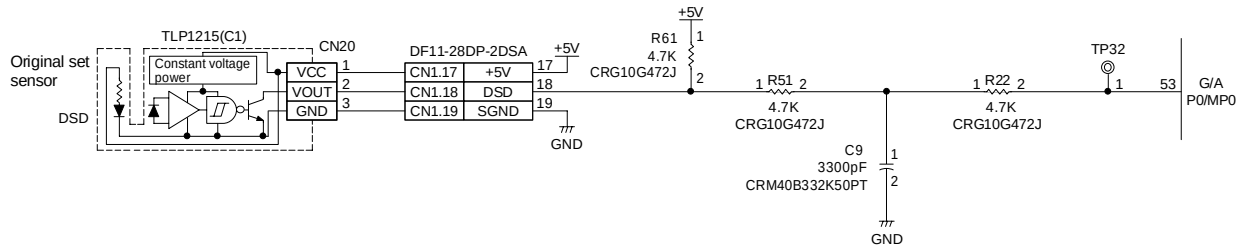
### [f] Tray original size detection circuit



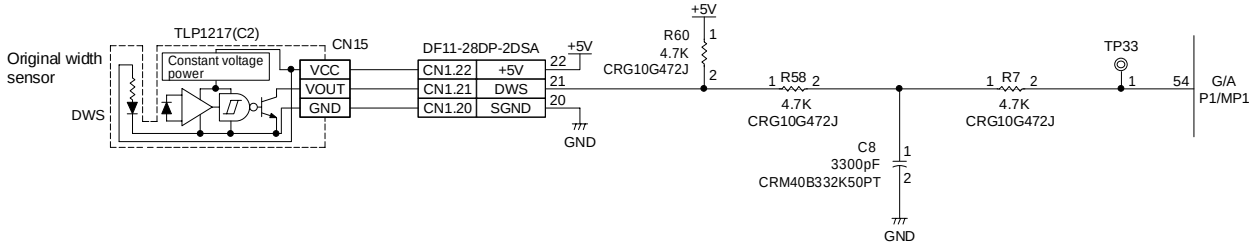

**Tray original size detection circuit**

This circuit is used to detect the original size on the tray. Its detecting section is included in the tray. The original width is detected with four lead switches (DWS1 ~ DWS4), and the original length is detected with two photo interrupters (DLS1, DLS2).
DWS1 ~ DWS4 are contact switches which close the contacts when magnetic flux of the magnet attached to the original guide is detected. The signals are passed in parallel through the noise filter to the CPU.
DWS1, 11 pin; DWS2, 10 pin; DWS3, 9 pin; DWS4, 8 pin
On the other hand, DLS1 and DLS2 use the photo interrupter which is integrated with the LED and the photo transistor. When there is an original, the lever type actuator interrupts the light path. The signal is inputted through the noise filter to the G/A, then through the data path to the CPU.
DLS1, 55 pin; DLS2, 56 pin (IC13)
The original end sensor 1 (DED1) which senses the third original also uses the photo interrupter. It is inputted to the CPU. DED1, 57 pin (IC1)

### [g] Original set detector (DED), original width sensor (DWS) input circuit



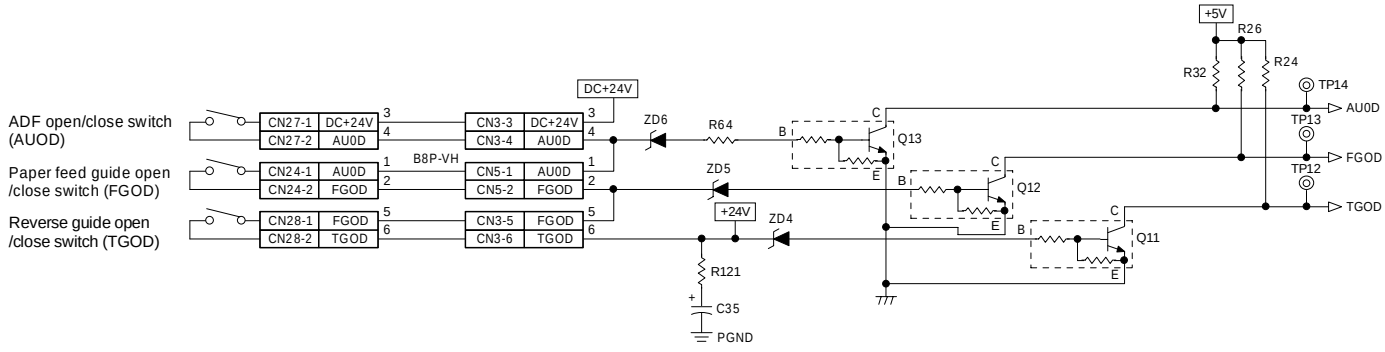

**Original sensor input circuit**




**Original width sensor input circuit**

This circuit is used to input each sensor signal. The noise filter is composed of C and R. Both sensors use a photo interrupter which is integrated with the LED and the photo transistor. The original set detector signal is inputted to IC13 53 pin, and the original width sensor signal is inputted to IC13 54 pin.

### [h] Open/close switch (AUOD, FGOD, TOD) input circuit

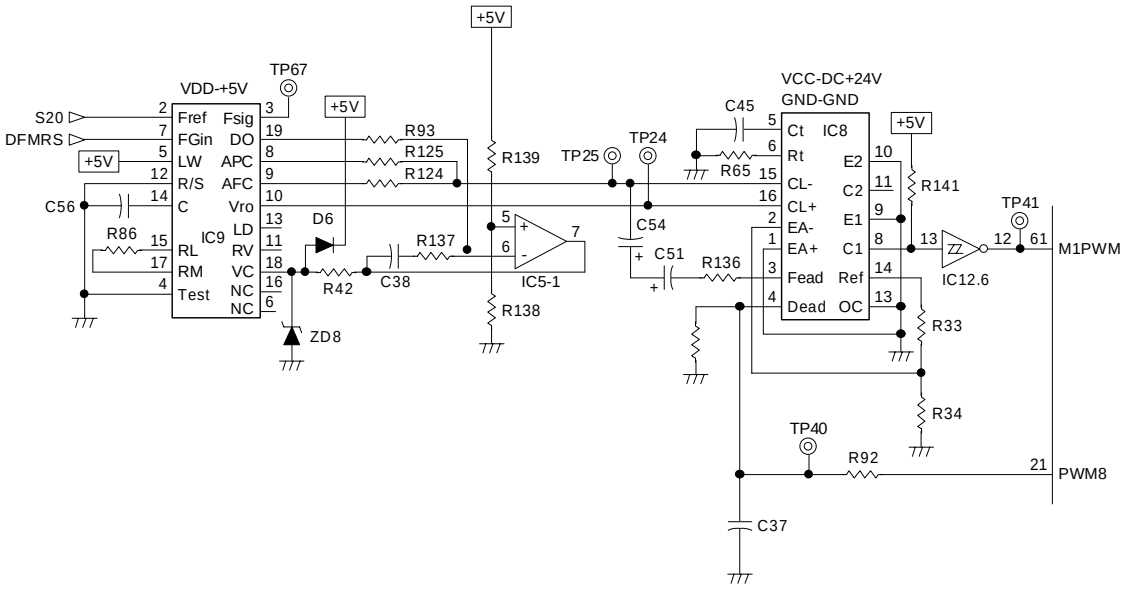



**Open/close switch input circuit**

This circuit is used to detect open/close of the ADF unit, the paper feed guide, and the reverse guide. It is connected with three microswitches. Each switch is closed by closing the switch section. They are connected in series from the +24V to directly turn on/off the power to each drive section. That is, only when all three switches are closed, the power is supplied to the drive section. When the ADF open/close switch is turned on, +24V is applied to the cathode of ZD6 and the base current is supplied to Q13 through R64, conducting Q13 and the open/close signal (close in this case) is inputted to IC13 60 pin.
The other open/close switches operate similarly, and each open/close signal is inputted to IC13.
R121 and C35 form the snubber circuit which absorbs an induced voltage generated when the open/close switch is opened during rotation of the DC motor.

## B. Motor control circuit

### [a] Paper feed motor (DFM) speed control circuit




**Motor control circuit**

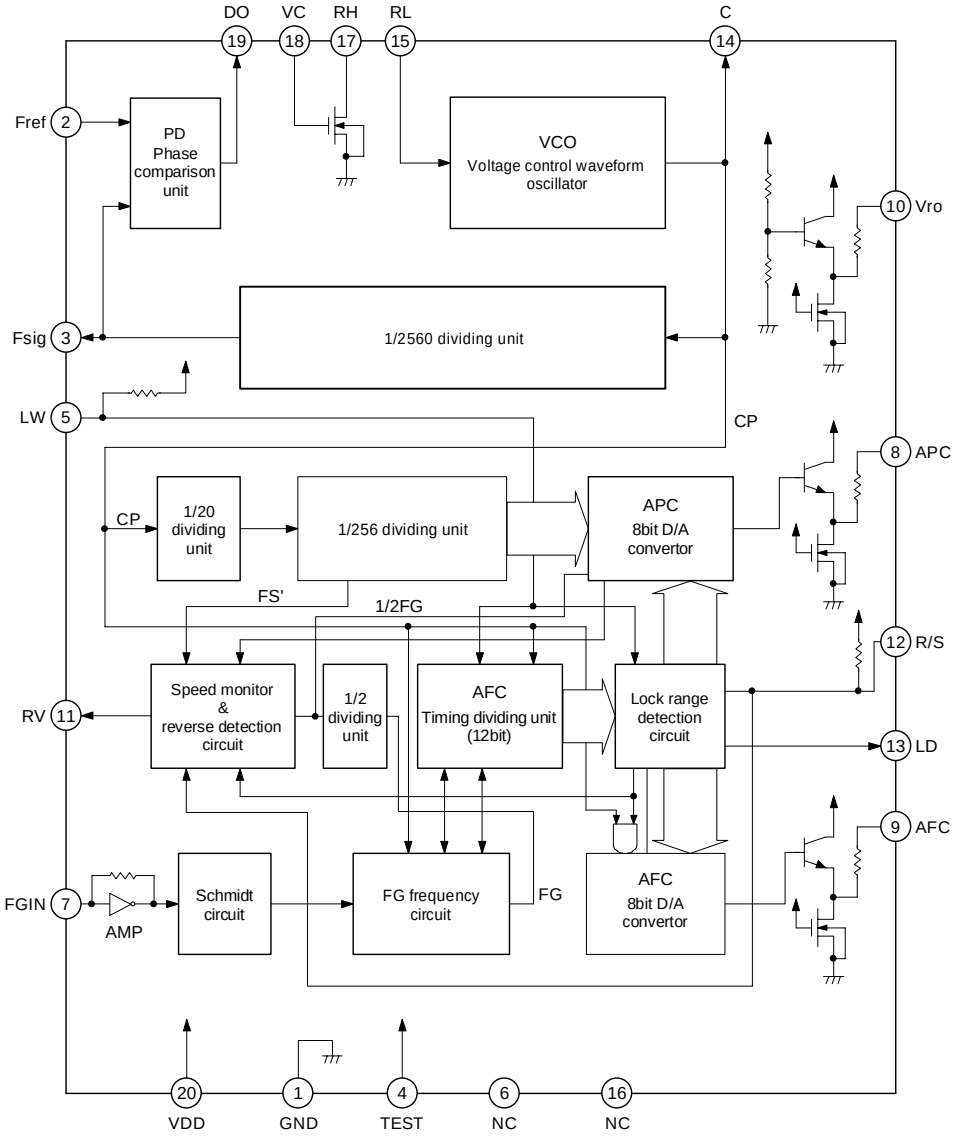
This circuit maintains the motor rotation at constant, and controls power supply to the paper feed motor so that the paper feed motor rotation sensor frequency coincides with the clock signal frequency.
This circuit is composed of the following four blocks:

(A) Reference clock switch circuit
(B) PLL circuit
(C) PWM circuit
(D) Overshoot prevention circuit

As the basic operations, the frequency difference and the phase difference of the paper feed motor rotation signal and the reference clock are converted into a voltage by the IC9 and PWM-modulated to synchronize the motor speed.
When rising to the low speed, the duty ratio of the PWM signal is forcibly limited to minimize overshoot of rotating speed.

## Block diagram

**TC9192AF (IC9 internal circuit)**




### (A) Reference clock switch circuit

The clock signal which serves as the reference of the rotation speed (the transport motor rotation signal or the clock signal outputted from the CPU 2 pin) is selected by G/A to be inputted to IC9 2 pin.

### (B) PLL circuit

Composed of the IC9 and its peripheral circuits.

The IC9 is the double PLL IC composed of the AFC/APC loop system for controlling the motor and the phase feedback loop system for generating the reference signal.

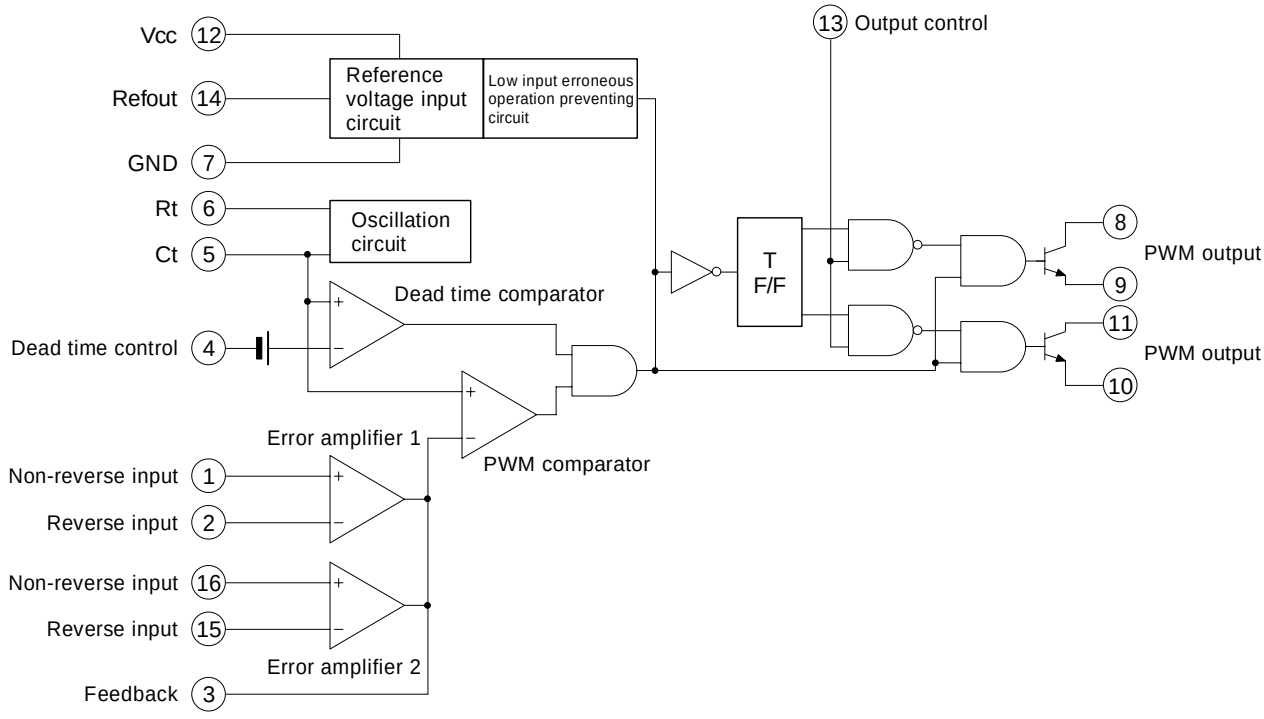
The former PLL is composed of speed control utilizing the F-V convertor and phase control utilizing the phase comparator. The latter PLL generates the output signal for controlling the former PLL, detects the phase difference between the internal oscillator and the reference clock, and generates pulses in proportion to the positive and negative.

First, the reference clock is inputted to the IC9 2 pin (Fref). While the signal of the sensor (encoder) whose motor speed is to be controlled is inputted the IC9 7 pin. When the motor speed is high, IC9 8 and 9 pins become LOW. When the motor speed is low, they become HIGH. When both clocks become of the same phase, the IC9 19 pin (Do) becomes high impedance.

This signal is passed through the low pass filter composed of IC5.1, R3, R93, R137 ~ R139, and C38 and fedback to IC9 18 pin (VC). R138 and R139 generate the reference voltage of the operation amplifier IC5.1. +5V is divided to provide 2.5V.

Since the power of IC5.1 is +24V, D6 and ZD8 prevents the output from becoming greater than +5V. Especially D6 operates when the power of +5V is cut off.

R86 and C56 are for internal oscillation.




**IC8 internal circuit**

### (C) PWM circuit

This circuit integrates the speed deviation signal and the phase difference signal and modulates the pulse width after adding the phase compensation. The IC8 is the PWM generator which includes the error amplifier, and saw teeth wave generator, the comparator, and the output buffer. R124, R125, R136, C51, and C54 are connected to the error amplifier in the IC8, forming the integral/phase compensation circuit. R65 and C45 set the frequency of saw teeth wave. It is about 25KHz for this circuit.

The integrated deviation signal is voltage-compared with the saw teeth wave by the PWM comparator to be the pulse signal of duty ratio in proportion to the deviation signal voltage. The comparator for adjusting the OFF period is also included in the IC8. By inputting a voltage to 4 pin, the OFF period of the PWM signal is increased. The LOW level period of IC8 PWM output (8 pin) becomes short when the paper feed motor rotation speed is increased, and the HIGH level period becomes shorter when the rotating speed is decreased.

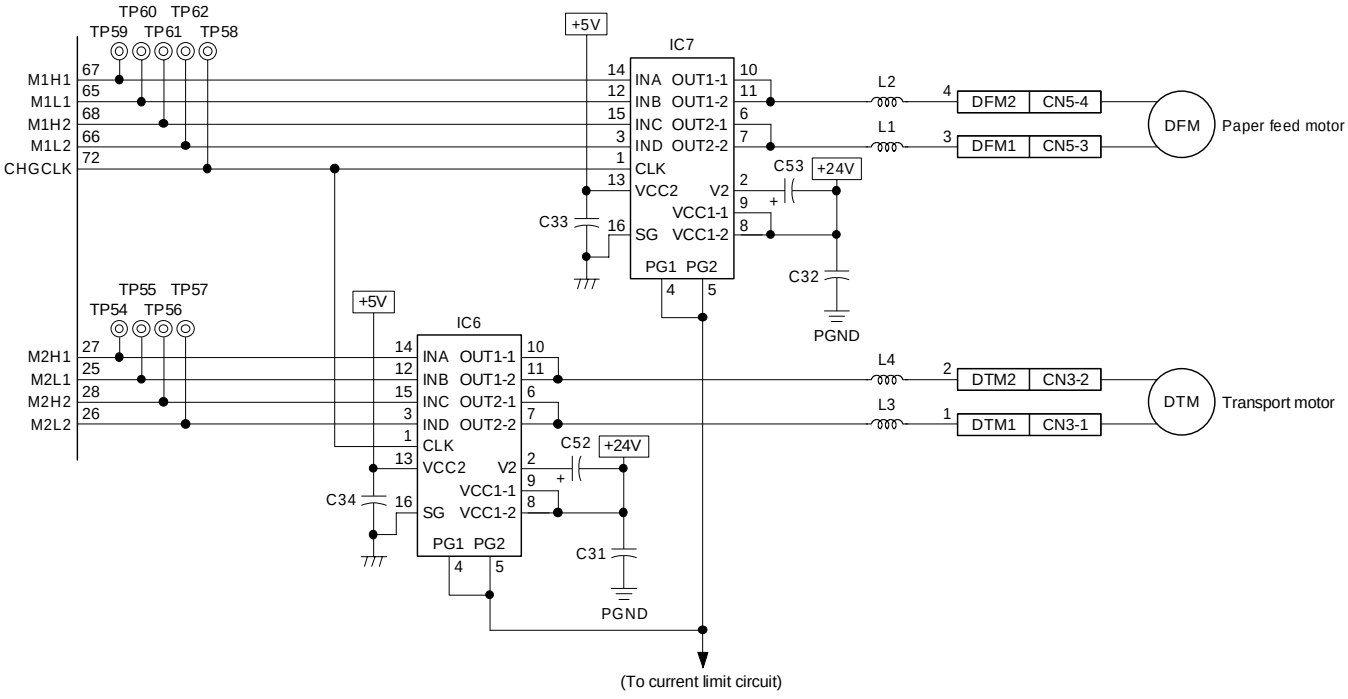
### (D) Overshoot prevention circuit

When the paper feed motor is raised to the low speed state, the speed is accelerated at a moment. Therefore, the OFF period of the PWM signal is made longer to limit the power supply to the paper feed motor.

This circuit integrates the low speed rising signal (PWM) outputted from IC13 (G/A) with R92 and C37, and passes it to the IC8 4 pin.

The input voltage integrated by the PWM duty is constant. The time duration is set according to the rising time.

### [b] Paper feed motor (DFM)/transport motor (DTM) drive circuit




**Paper feed motor/transport motor drive circuit**

This circuit controls rotation/stop and the rotating direction of each motor, and is composed of G/A (IC 13) and the exclusive-use hybrid IC (IC6, IC7). The circuit composition is the same in the paper feed motor drive circuit and the transport motor drive circuit. The descriptions are made for the transport motor drive circuit.

The motor rotation, stop, rotating direction are controlled by combination of binary logic inputted to G/A through the data path from the CPU. By this, the control signal is inputted to the G/A 25-28 pins. The G/A 25 pin and 26 pin are the PWM output for speed control. (Normal rotation, 26 pin; reverse rotation, 25 pin)

These signals are inputted to the IC6. The IC6 is the hybrid IC including four power MOSFETs, and takes the G/A output 25 pin ~ 28 pin, and drives the motor.

The motor operates according to the combination of 25 pin ~ 28 pin as shown in the table below:

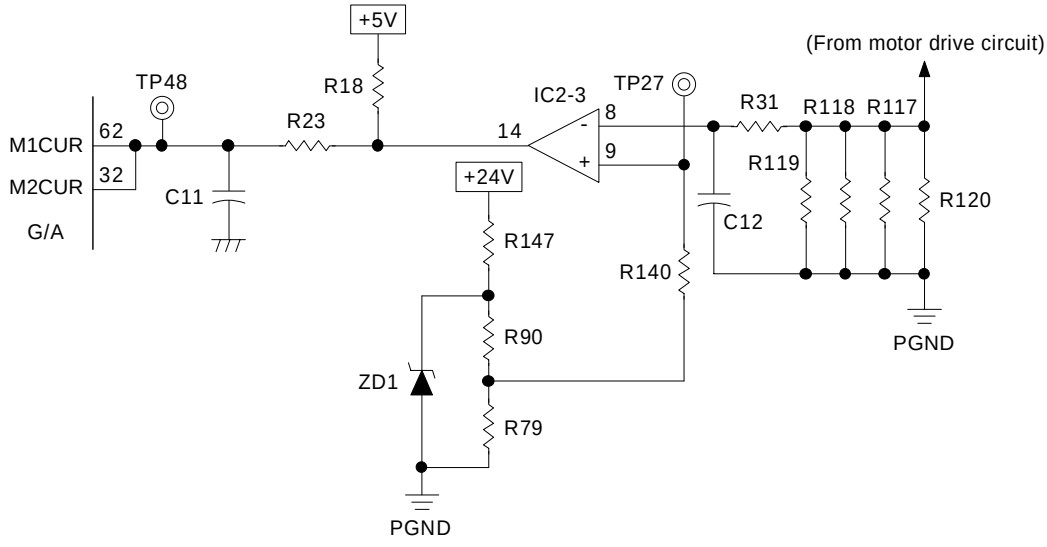
| | 25 | 26 | 27 | 28 |
|---|---|---|---|---|
| Before start | 0 | 0 | 0 | 0 |
| CW | 0 | PWM | 1 | 0 |
| CCW | PWM | 0 | 0 | 1 |
| Brake | 0 | 0 | 1 | 1 |

The paper feed motor operates as follows:

| | 65 | 66 | 67 | 68 |
|---|---|---|---|---|
| Before start | 0 | 0 | 0 | 0 |
| CW | 0 | PWM | 1 | 0 |
| CCW | PWM | 0 | 0 | 1 |
| Brake | 0 | 0 | 1 | 1 |

In the brake mode, the both terminals of the motor are shorted, generating a strong brake torque to stop the motor.

### [c] Current limiting circuit

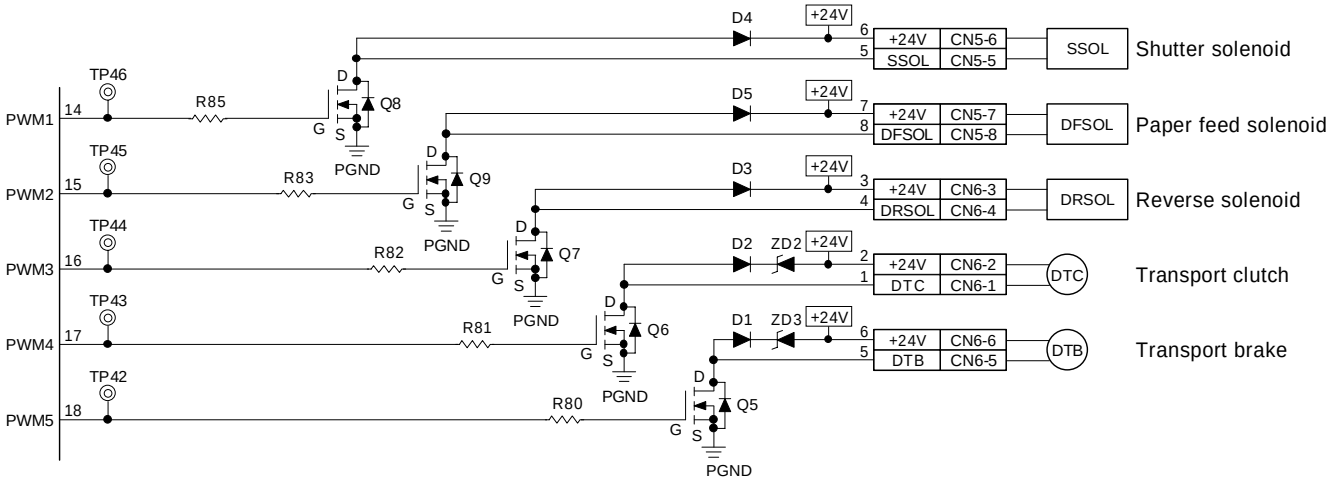



**Current limiting circuit**

This circuit limits the starting current, and is composed of the current value detecting resistor and the voltage comparator.
The negative potential side of each motor is connected to the pick-up resistor of R117, R118, R119, and R120. The current flowing through the drive circuit is converted into a voltage by this pick-up resistor. The converted voltage value is compared with the reference voltage by the comparator (IC2.3). The reference voltage is obtained by dividing the zenor voltage generated by R147 and ZD1 with R79 and R90. The reference voltage is about 0.3V. When the converted voltage exceeds the reference voltage (the current value is about 6V), the IC2.3 14 pin is reversed to LOW and inputted to G/A 32 pin and 62 pin, interrupting the supply of +24V to the motor. As a result, the current will not exceed more.
When the converted voltage falls below the reference voltage, +24V is supplied again to start conduction to the motor.
Since this circuit operates on a rather high current, it does not operate under the normal conditions.

## C. Solenoids, clutches, brake drive circuit

### [a] Paper feed solenoid (DFSOL), shutter solenoid (SSOL), reverse solenoid (DRSOL), transport clutch (DTC), transport brake (DTB) drive circuit

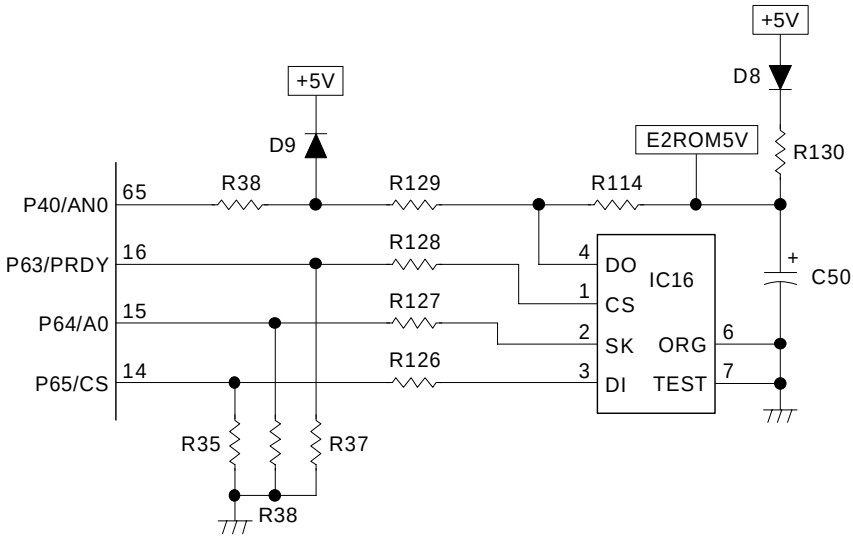



**Solenoid, clutch, brake drive circuit**

This circuit drives the paper feed solenoid which operates the weight plate spring to press the originals on the tray, the shutter solenoid which operates the originals stopper plate, the reverse solenoid which operates the reverse guide that induces the original to the reverse path, the transport clutch which connects/releases the transport belt and the transport motor, and the transport brake which fixes the transport belt when the original is stopped and when the original is pulled out. They are of the same basic construction.
The drive signal level (ON at HIGH) outputted from the G/A in inputted to the gate of FET (Q5 ~ Q9). The drive signal allows to vary the ON duty in the range of 0 ~ 100% (255 steps). However, the frequency is fixed to 20KHz. ZD2 and ZD3 of the transport clutch and the brake are used to reduce the release time by decreasing the loop current at OFF.

## D. Other circuits

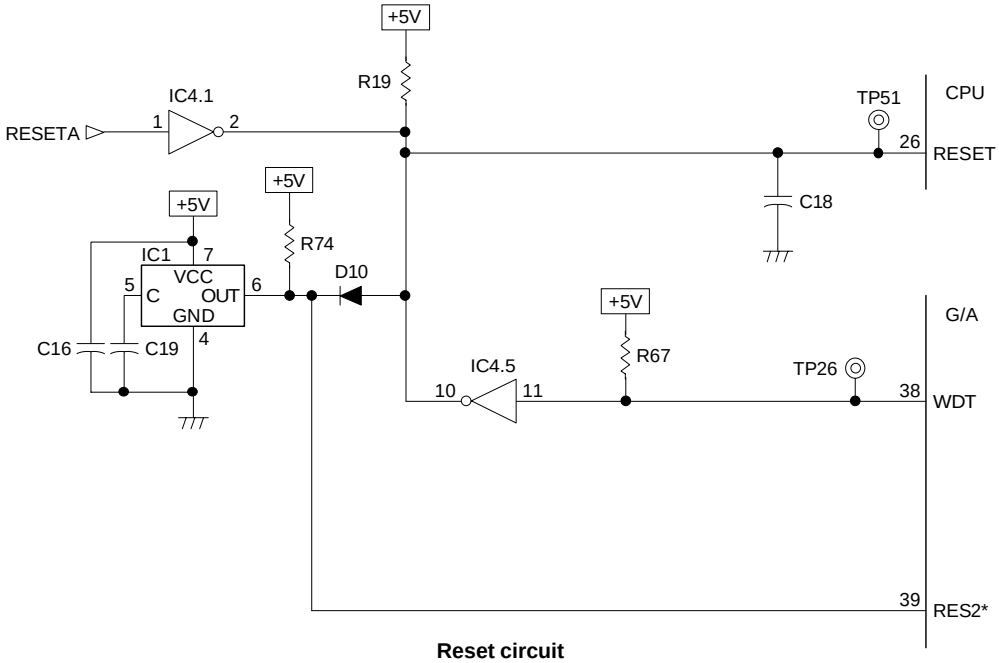
### [a] EEPROM (IC10) circuit




**EEPROM circuit**

This memory stores the sensitivity data of the reflection sensors, the set position data of the originals on the original glass, and the counter values such as the original pass count. Data communication with the CPU (IC3) is made through the three-wire serial interface. The stored data remains even though the power is turned off.
The IC10 1 pin is the chip select pin, which is driven to HIGH to perform data communication.
2 pin is the serial clock pin. The serial data is transmitted in synchronization with the clock inputted to 2 pin. 3 pin is the input pin of serial data from the CPU. 4 pin is the output pin of serial data from IC10.
D8, R130, and C50 form a circuit which maintain the IC10 voltage in case of a sudden, unexpected drop in the power voltage.

### [b] Reset circuit

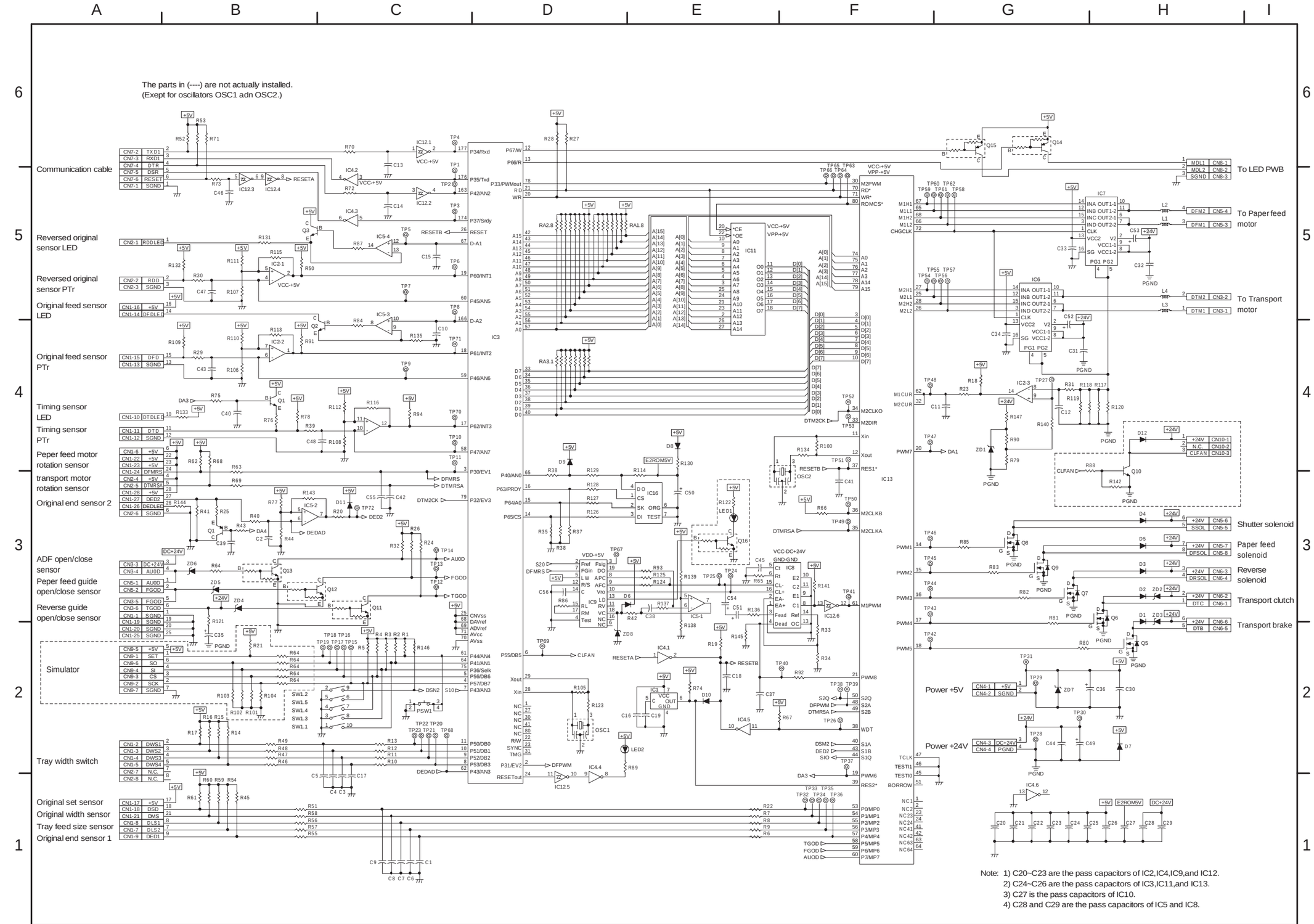


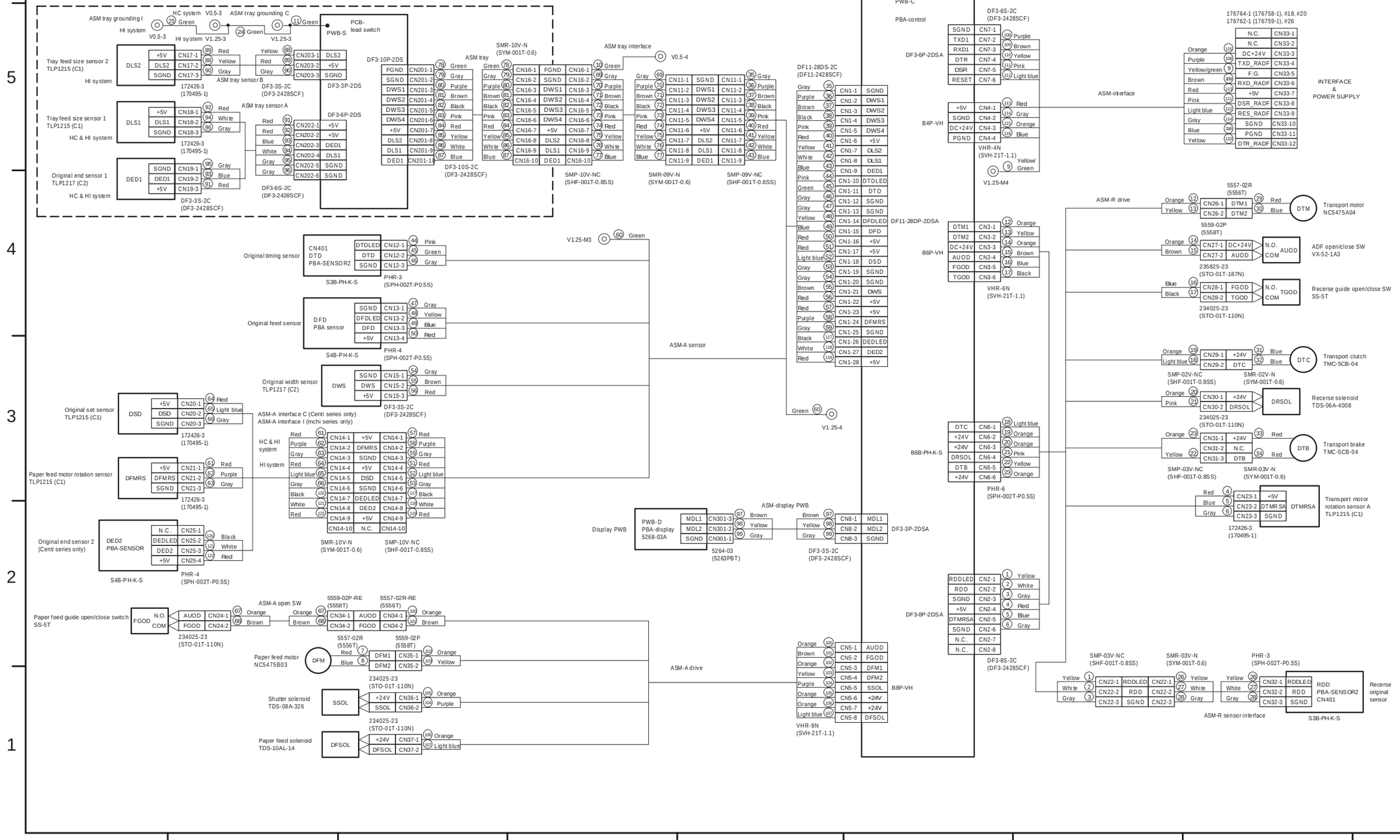

**Reset circuit**

This circuit generates the reset signal of he CPU and G/A, and is composed of IC1 and its peripheral circuits.
The IC1 performs resetting when supplying the power and in case of abnormal drop of +5V. After supplying the power, the power line reaches about 4.3V. The reset state is maintained for a certain period afterward. The reset state remaining time depends on the capacity of C19.
This circuit is also provided with the watch-dog timer function. The watch-dog timer is included in the G/A (IC13), and starts operation when RES2 becomes HIGH. This monitors the CPU abnormalities such as a hang-up.
RES2 is reset for the watch-dog timer in the G/A, and is separated from the CPU and the G/A RES1 by means of D10. Therefore, the CPU RESET and G/A RESET will not become HIGH in advance to RES2 does.
For monitoring, some data (initial value) is written from the CPU to the G/A once every 5ms. (The value is reset to the initial value once every 5ms.)
This data is used to count down in the G/A. The count will not be "0" because it returns to the initial value every 5ms. If however, the CPU hangs up, the data does not return to the initial value and the count becomes "0." At this time, reset is made from the G/A to the CPU and G/A (RES1), and retry is made until the CPU resumes.

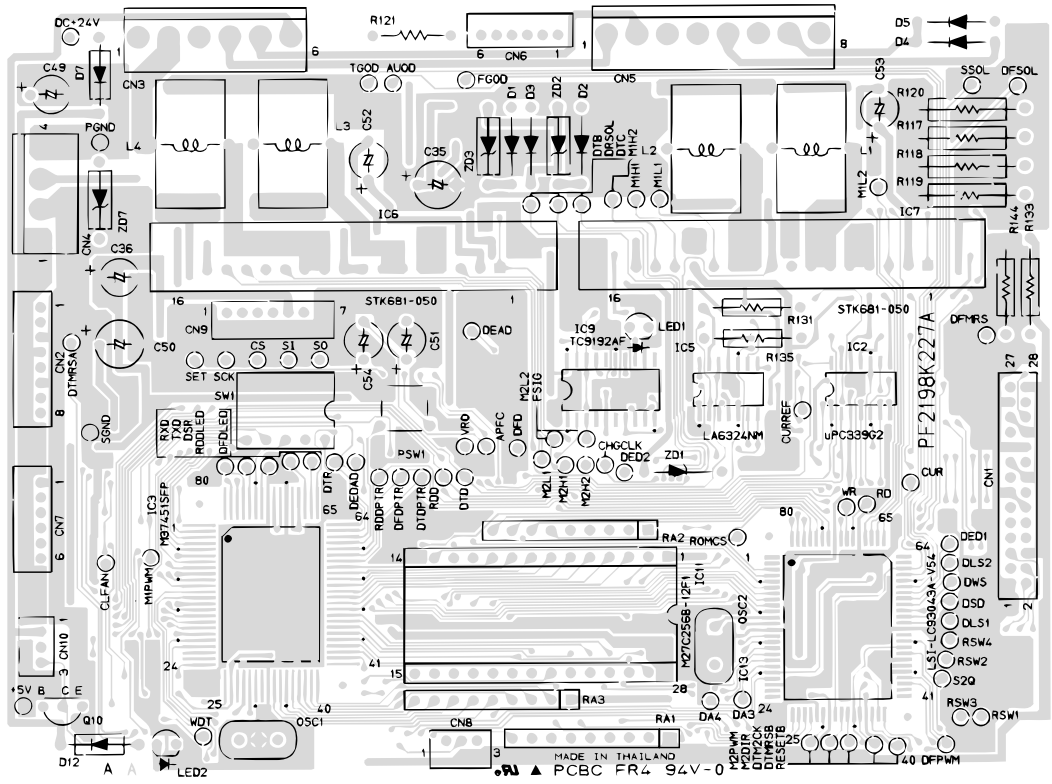
# [10] CIRCUIT DIAGRAM

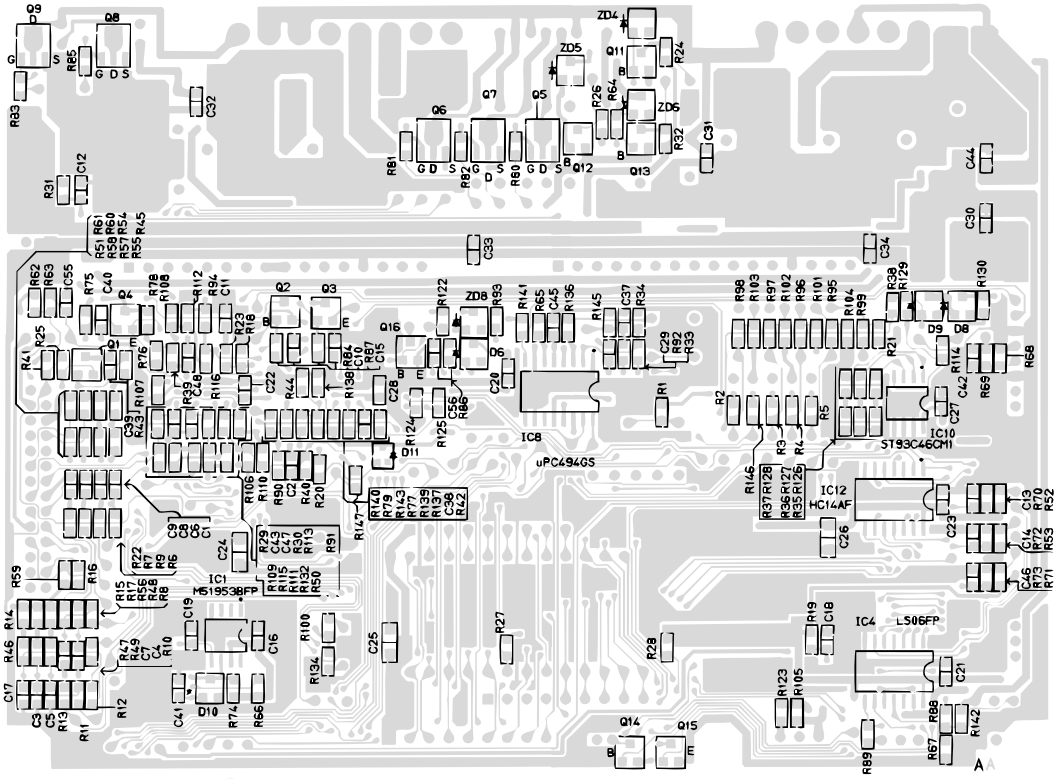
## A. Circuit Diagram


The parts in (----) are not actually installed.
(Exept for oscillators OSC1 adn OSC2.)
Communication cable
Reversed original sensor LED
Reversed original sensor PTr
Original feed sensor LED
Original feed sensor PTr
Timing sensor LED
Timing sensor PTr
Peper feed motor rotation sensor
transport motor rotation sensor
Original end sensor 2
ADF open/close sensor
Peper feed guide open/close sensor
Reverse guide open/close sensor
Simulator
Tray width switch
Original set sensor
Original width sensor
Tray feed size sensor
Original end sensor 1
To LED PWB
To Paper feed motor
To Transport motor
Shutter solenoid
Paper feed solenoid
Reverse solenoid
Transport clutch
Transport brake
Power +5V
Power +24V
Note: 1) C20~C23 are the pass capacitors of IC2,IC4,IC9,and IC12.
2) C24~C26 are the pass capacitors of IC3,IC11,and IC13.
3) C27 is the pass capacitors of IC10.
4) C28 and C29 are the pass capacitors of IC5 and IC8.

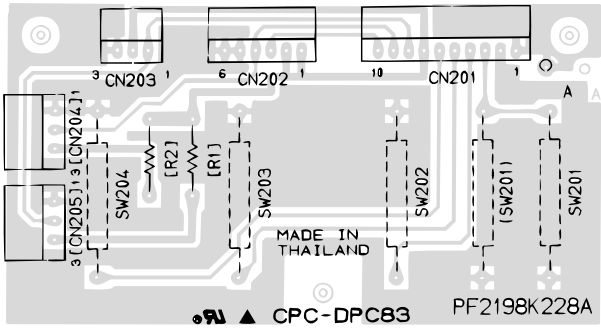

PWB-S
PCB-
lead switch
PWB-C
PBA-control
ASM tray grounding I
ASM tray grounding C
HC system
HI system
V0.5-3
V1.25-3
Green
Tray feed size sensor 2
TLP1215 (C1)
Trayfeed size sensor 1
TLP1215 (C1)
Original end sensor 1
TLP1217 (C2)
DLS2
DLS1
DED1
+5V
SGND
CN17-1
CN17-2
CN17-3
CN18-1
CN18-2
CN18-3
CN19-1
CN19-2
CN19-3
172426-3
(170495-1)
DF3-3S-2C
(DF3-2428SCF)
ASM tray sensor B
ASM tray sensor A
CN203-1
CN203-2
CN203-3
CN202-1
CN202-2
CN202-3
CN202-4
CN202-5
CN202-6
DF3-3P-2DS
DF3-6P-2DS
DF3-6S-2C
DF3-10P-2DS
CN201-1
CN201-2
CN201-3
CN201-4
CN201-5
CN201-6
CN201-7
CN201-8
CN201-9
CN201-10
FGND
SGND
DWS1
DWS2
DWS3
DWS4
+5V
DLS2
DLS1
DED1
DF3-10S-2C
(DF3-2428SCF)
SMR-10V-N
(SYM-001T-0.6)
ASM tray
ASM tray interface
V0.5-4
CN16-1
CN16-2
CN16-3
CN16-4
CN16-5
CN16-6
CN16-7
CN16-8
CN16-9
CN16-10
SMP-10V-NC
(SHF-001T-0.8SS)
SMR-09V-N
(SYM-001T-0.6)
SMP-09V-NC
(SHF-001T-0.8SS)
CN11-1
CN11-2
CN11-3
CN11-4
CN11-5
CN11-6
CN11-7
CN11-8
CN11-9
DF11-28DS-2C
(DF11-2428SCF)
DF11-28DP-2DSA
CN1-1
CN1-2
CN1-3
CN1-4
CN1-5
CN1-6
CN1-7
CN1-8
CN1-9
CN1-10
CN1-11
CN1-12
CN1-13
CN1-14
CN1-15
CN1-16
CN1-17
CN1-18
CN1-19
CN1-20
CN1-21
CN1-22
CN1-23
CN1-24
CN1-25
CN1-26
CN1-27
CN1-28
DTDLED
DFD
DSD
DFMRS
DEDLED
DED2
SGND
+5V
DF3-6S-2C
(DF3-2428SCF)
SGND
TXD1
RXD1
DTR
DSR
RESET
CN7-1
CN7-2
CN7-3
CN7-4
CN7-5
CN7-6
DF3-6P-2DSA
B4P-VH
+5V
SGND
DC+24V
PGND
CN4-1
CN4-2
CN4-3
CN4-4
VHR-4N
(SVH-21T-1.1)
V1.25-M4
DTM1
DTM2
DC+24V
AUOD
FGOD
TGOD
CN3-1
CN3-2
CN3-3
CN3-4
CN3-5
CN3-6
B6P-VH
VHR-6N
(SVH-21T-1.1)
DTC
+24V
DRSOL
DTB
CN6-1
CN6-2
CN6-3
CN6-4
CN6-5
CN6-6
B6B-PH-K-S
PHR-6
(SPH-002T-P0.5S)
RDDLED
RDD
CN2-1
CN2-2
CN2-3
CN2-4
CN2-5
CN2-6
CN2-7
CN2-8
DF3-8P-2DSA
DF3-8S-2C
(DF3-2428SCF)
ASM-interface
176764-1 (176758-1), #18, #20
176762-1 (176759-1), #26
N.C.
DC+24V
TXD_RADF
F.G.
RXD_RADF
+5V
DSR_RADF
RES_RADF
SGND
PGND
DTR_RADF
CN33-1
CN33-2
CN33-3
CN33-4
CN33-5
CN33-6
CN33-7
CN33-8
CN33-9
CN33-10
CN33-11
CN33-12
INTERFACE
&
POWER SUPPLY
ASM-R drive
5557-02R
(5556T)
5559-02P
(5558T)
Transport motor
NCS475A04
DTM
ADF open/close SW
VX-52-1A3
235825-23
(STO-01T-187N)
Recerse guide open/close SW
SS-5T
234025-23
(STO-01T-110N)
Transport clutch
TMC-5CB-04
DTC
SMP-02V-NC
(SHF-001T-0.8SS)
SMR-02V-N
(SYM-001T-0.6)
Recerse solenoid
TDS-06A-4008
DRSOL
Transport brake
TMC-5CB-04
DTB
SMP-03V-NC
(SHF-001T-0.8SS)
SMR-03V-N
(SYM-001T-0.6)
Transport motor
rotation sensor A
TLP1215 (C1)
DTMRSA
PHR-3
(SPH-002T-P0.5S)
ASM-R sensor interface
RDD
PBA-SENSOR2
CN401
Recerse
original
sensor
S3B-PH-K-S
CN401
DTD
PBA-SENSOR2
Original timing sensor
DTDLED
DTD
SGND
CN12-1
CN12-2
CN12-3
PHR-3
(SPH-002T-P0.5S)
Original feed sensor
DFD
PBA sensor
DFDLED
DFD
+5V
CN13-1
CN13-2
CN13-3
CN13-4
PHR-4
(SPH-002T-P0.5S)
S4B-PH-K-S
Original width sensor
TLP1217 (C2)
DWS
CN15-1
CN15-2
CN15-3
DF3-3S-2C
(DF3-2428SCF)
Original set sensor
TLP1215 (C1)
DSD
CN20-1
CN20-2
CN20-3
ASM-A interface C (Centi series only)
ASM-A interface I (Inchi series only)
HC & HI
system
HI system
CN14-1
CN14-2
CN14-3
CN14-4
CN14-5
CN14-6
CN14-7
CN14-8
CN14-9
CN14-10
DFMRS
SGND
DEDLED
DED2
N.C.
SMR-10V-N
(SYM-001T-0.6)
SMP-10V-NC
(SHF-001T-0.8SS)
Paper feed motor rotation sensor
TLP1215 (C1)
CN21-1
CN21-2
CN21-3
Original end sensor 2
(Centi series only)
CN25-1
CN25-2
CN25-3
CN25-4
V1.25-M3
V1.25-4
ASM-A sensor
ASM-A drive
ASM-display PWB
Display PWB
PWB-D
PBA-display
5268-03A
MDL1
MDL2
CN301-1
CN301-2
CN301-3
5264-03
(5263PBT)
CN8-1
CN8-2
CN8-3
DF3-3P-2DSA
DF3-3S-2C
(DF3-2428SCF)
CN5-1
CN5-2
CN5-3
CN5-4
CN5-5
CN5-6
CN5-7
CN5-8
AUOD
FGOD
DFM1
DFM2
SSOL
DFSOL
B8P-VH
VHR-8N
(SVH-21T-1.1)
Paper feed guide open/close switch
SS-5T
FGOD
N.O.
COM
CN24-1
CN24-2
234025-23
(STO-01T-110N)
ASM-A open SW
5559-02P-RE
(5558T)
5557-02R-RE
(5556T)
CN34-1
CN34-2
Paper feed motor
NC5475B03
DFM
Shutter solenoid
TDS-08A-326
SSOL
Paper feed solenoid
TDS-10AL-14
DFSOL
CN36-1
CN36-2
CN37-1
CN37-2
A
B
C
D
E
F
G
H
I
1
2
3
4
5
6

## C. Control PWB

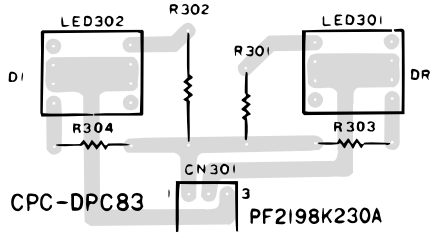


## D. Lead switch PWB




## E. LED PWB




## F. Sensor PWB1

## G. Sensor PWB2